

ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

A GILLETTE PUBLICATION

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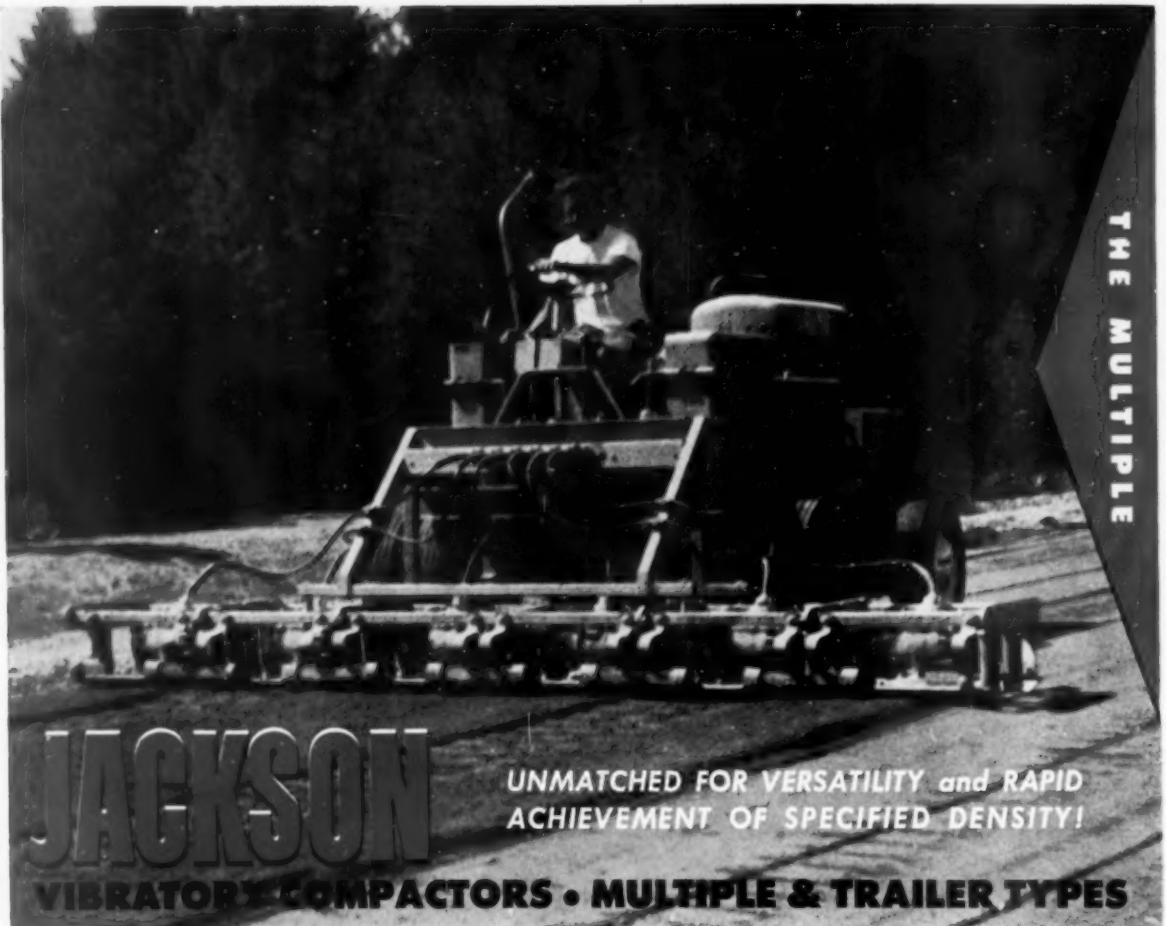
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April, 1959

UNIVERSITY MICROFILMS
SERIALS
SECTION

THE MULTIPLE



JACKSON

VIBRATORY COMPACTORS • MULTIPLE & TRAILER TYPES

UNMATCHED FOR VERSATILITY and RAPID
ACHIEVEMENT OF SPECIFIED DENSITY!

Each of the compactor units employed in the workheads of these machines supplies **FORTY-TWO HUNDRED 6,000 lb. VIBRATORY BLOWS PER MINUTE** and achieves maximum density of any granular material used in base courses and fills in the fastest possible time.

Each compactor unit may be operated independently and hence units may be detached from the maximum coverage arrangement of 6 units in the workhead (13', 3") to ideally fit each job; or they may be regrouped in a wide variety of tandem arrangements for more rapid densification of narrower areas. And in the case of the TRAILER COMPACTOR as many as eight compactor units may be employed in two workheads of 4 each — one in front and the other following the trailer.

NEWLY DESIGNED COMPACTOR BASES PERMIT OPERATION OF BOTH THE MULTIPLE AND TRAILER COMPACTORS IN EITHER DIRECTION — NO DEADHEADING OR TURNING REQUIRED.

Used on nearly all of the nation's major highway projects, including the AASHO Test Road, the JACKSON MULTIPLE COMPACTOR has thoroughly demonstrated the outstanding advantages of this method of compaction. With the advent of the JACKSON TRAILER COMPACTOR it is conveniently adaptable to paving projects of nearly every type and size.

... for more details circle 335 on enclosed return postal card



JACKSON TRAILER COMPACTOR — May be pushed or pulled by any prime mover capable of working speeds as low as 50 F.P.M. Towed to location at any road speed . . . operated in either direction . . . controlled by operator of prime mover. Power plant supplies both single and 3-phase 110-150 volt, 60-80 cycle A.C. and has many uses.

FOR SALE OR RENT FROM YOUR JACKSON DISTRIBUTOR. Name and descriptive literature sent on request.

**JACKSON VIBRATORS
INC., LUDINGTON, MICH.**

Can your loader "lift its lip" and duplicate dozer action? No?

Then trade it off without delay! Because you'll miss money-making opportunities right and left without this big-capacity 4-in-1 action. And you have positive "radius control" of dozing depth; plus strength for hard digging! Here, the new International Drott TD-20 4-in-1 is dozing on a heavy grading job.



Can your loader grade and strip like a carry-type scraper? No?

Then consider what extra service—and extra-valuable service you could deliver your customers—with versatile scraper-like action at your fingertips with a moderately-priced 4-in-1! This TD-20 4-in-1 is finish-grading sticky clay around a new Cedar Rapids, Ia., factory!



ONLY A CLAM-ACTION 4-IN-1

*can replace up to \$100,000
of limited-duty equipment!*



Can your loader "bottom-dump" and handle sticky materials? No?

Then retire the "relic" and go modern! You can't choose the materials you excavate. You can't prevent adverse weather that makes materials sticky! But 4-in-1 bottom-dumping eliminates the sticky materials problem and gives you a vital dumping height plus advantage over ordinary roll-forward buckets.

Move the selector lever—prove to yourself only the clam-action 4-in-1 doubles for a whole spread of "big-ticket" rigs—gives instant changeovers. Compare 4-in-1 capacity and versatility to any single-action loader. Measure exclusive shock-swallowing Hydro-Spring advantages. See your International Drott Distributor for a demonstration—prove you can save up to \$100,000 on equipment!

Does your loader have measured, advertised breakout action? No?

It's the genuine and exclusive pry-over-shoe breakout action that enables International Drott 4-in-1's to replace far costlier boom-type rigs on jobs like breaking up and loading out old pavement. The NEW TD-15 4-in-1 exerts the enormous force of 39,200 lbs.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin



**INTERNATIONAL[®]
DROTT**

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ROADS AND STREETS

A GILLETTE PUBLICATION

APRIL, 1959

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NUMBER 4

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by R. L. Peurifoy.

● *Eight-Laning California's Grapevine Grade. With Guy F. Atkinson's grading crew on project involving heavy grading and centralized wet-concrete-or-dry-batch production for paving and structures.*

LANDED A BIG ONE?

GO WITH GOODYEAR—
for Big-Job profit protection

BIG-JOB ANALYSIS

Here's how your job gets a flying start to success. Goodyear Big-Tire Specialists make a detailed check of every phase of the project: terrain, climate, loads, roads, schedules, speeds and any other pertinent factors. Then they recommend from Goodyear's complete line, the exact tire, tread and cord design that your job needs.

BIG-TIRE EXPERIENCE

Goodyear has built *MORE* pneumatic tires than anyone else. This Goodyear record is your assurance that selection of tires for *your* jobs is based on the broadest practical experience available anywhere and today's top tire-building advancements. For Goodyear paces the industry with the most practical tread and body designs, rubber compounds and Triple-Tough 3-T Nylon Cord — GREATEST TIRE SAVER IN 24 YEARS.

BIG-TIRE SERVICE

Finally, Goodyear Big-Tire Specialists help you set up, and even operate, a tire-maintenance program to save you BIG MONEY in man-hours, machine hours and useful tire life. This includes proper mounting, mating and rotating of tires; correct inflation, cleaning and regular inspection to insure that small injuries are found and repaired before expensive damage can result. In fact, Goodyear can, and will, supply any degree of Big-Tire Service that any contractor can profitably use on any job anywhere.

And — BIG TIRE PERFORMANCE

Example: SUPER HARD ROCK LUG

Goodyear has the right tire for every wheel. When the job calls for a wide-base earth-mover tire, for instance, Goodyear's new SUPER HARD ROCK LUG delivers the best all-round performance. This Super Tire, made with the new "square" shoulder design, packs a hefty rubber bonus for stronger bite, longer wear. Yet, it costs no more than conventional wide-base tires. For full details, see your nearby Goodyear dealer, or write: Goodyear, Truck Tire Dept., Akron 16, Ohio.



TRUCK TIRES by

GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

... for more details circle 325 on enclosed return postal card

ESSICK

TANDEM ROLLERS



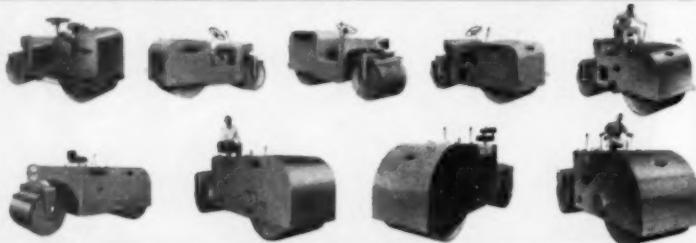
Model 560 - 3 1/2 to 5 1/2 Ton Roller

There's a

BIG DIFFERENCE over a million miles of proof!

Essick Rollers, engineered and designed to offer a completely integrated line of 14 models, from 1/2 ton to 14 tons, are saving contractors thousands of dollars by providing more compaction at less cost—for any size job.

Contractors that use them... recommend them!
See for yourself—ask for a demonstration



14 models of Tandem Rollers — from 1/2 ton to 14 tons

ESSICK MANUFACTURING COMPANY

1950 Santa Fe Avenue
Los Angeles 21, California

850 Woodruff Lane
Elizabeth, New Jersey

Affiliated with THE T. L. SMITH CO., Milwaukee, Wisconsin

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ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 67 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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New BROS Roller... See how you can benefit by these 15 improved features



NEW EASE AND SPEED FOR BASE AND SURFACE COMPACTION

Big news about the new 3 to 10 ton BROS SP-54B.

A new "Velvet Drive" hydraulic reversing transmission provides sure, effortless control for back-and-forth rolling. Automotive type hydraulic power steering and short turning radius makes turn-arounds easy—even on city streets.

Especially important, horsepower is correctly matched to job needs, keeping your fuel costs and engine maintenance to the minimum. Yet it provides the extra draw bar pull to tow a second roller on base and grade work.

A 40 gal. gas tank keeps the SP-54B working a full shift without refueling stops. High travel speeds to 20 MPH cuts time traveling between rolling jobs.

Special sculptured roller chain sprockets provide

full oscillation of drive wheel pairs. This eliminates complicated mechanisms which require frequent maintenance or service. New, 60% over-size high capacity Timken wheel bearings are mounted on husky, high-strength axles. A special triple groove steel labyrinth type seal and triple lip synthetic grease seal keep dirt and grit out.

Parking brake on drive shaft and individual service brakes on all 4 drive wheels add 95% more brake capacity . . . adding a greater margin of operator safety and control.

OTHER SP-54B FEATURES INCLUDE:

Torque converter drive. . . . Direct connection of steering ram to front bolster. . . . Lower center of gravity and lower silhouette. . . . Easy access to drive train. . . . New plastic scrapers to prevent tire pick-up. . . . 100% coverage by $\frac{1}{2}$ in. tire overlap.

Get the full story. See your BROS Dealer or write for full information and/or demonstration.



BROS Incorporated

ROAD MACHINERY DIVISION
1057 Tenth Avenue S.E., Minneapolis 14, Minnesota

Write today for a new 8-page catalog which fully describes the SP-54B. It's free of cost or obligation!



SHEEPSFOOT
TAMPERS



ROLL-O-FACTOR



PREPARATOR



30-TON SELF-
PROPELLED ROLLER



VIBRA-FACTOR



9 AND 13-TON
ROLLERS

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1. NO HARMFUL DEPOSITS, no stuck rings or valves in diesels lubricated with Texaco Ursus Super Duty, a series 3 oil, because Ursus is refined and processed specifically to keep engines clean and on the job with minimum maintenance.

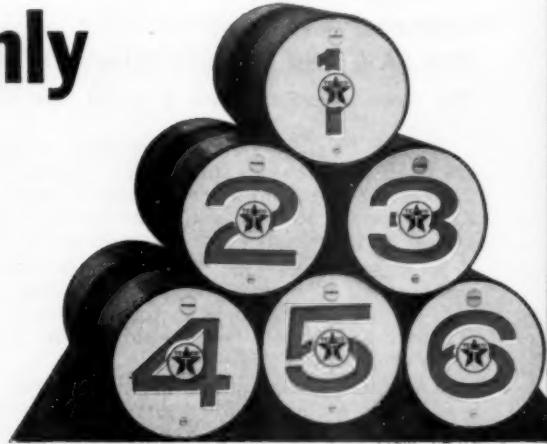


2. DUST AND DIRT STAY OUTSIDE when you lubricate wheel bearings, chassis and water pump with Texaco Marfak Multi-Purpose 2. Marfak stays put despite shock, vibration and moisture.

Why you need only 6 lubricants to handle all your lubrication

The Texaco Simplified Lubrication Plan combines special and general-purpose lubricants to handle the greatest variety of equipment with the fewest possible lubricants.

Every Texaco Simplified Lubrication Plan is organized for a particular job. That way you get top performance from every piece of equipment, plus all the advantages of low lubricant inven-



tory: fewer manhours spent in storage and handling, less paperwork in ordering, less chance for mistakes in application. A Texaco Lubrication Engineer will be glad to develop a Texaco Plan to meet your needs. Just call the nearest of the 2,000 Texaco Distributing Plants, or write:

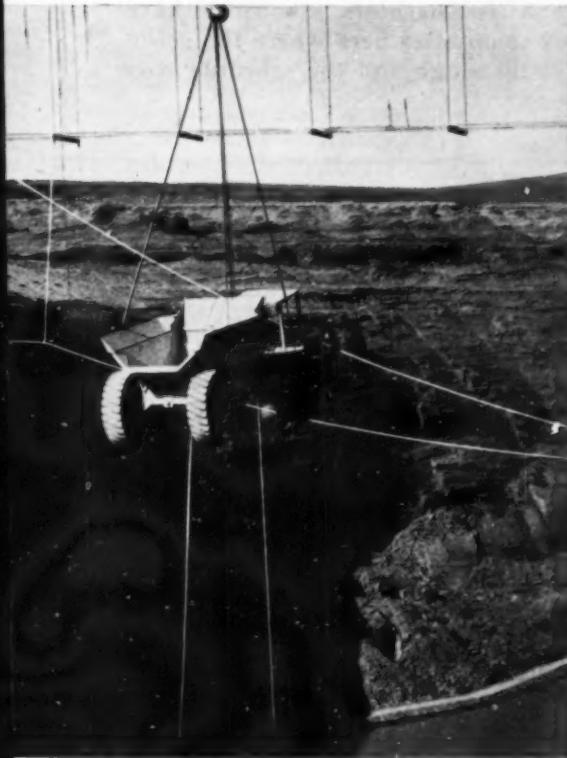
★ ★ ★
The Texas Company, 135 East 42nd Street,
New York 17, N. Y.



3 SHOCK AND STRAIN won't break the tough film that Texaco Universal Gear Lubricant EP puts on differential and transmission gears. Universal Gear Lube is designed to take highly concentrated extreme pressure loadings.



4 HYDRAULIC SYSTEMS STAY CLEAN, give steady, powerful hydraulic action, with Texaco Regal Oil R&O. It's inhibited to prevent rust, minimize oxidation and foaming. Keeps air compressors on the job longer, too.



5 MOISTURE CAN'T PENETRATE cables and wire ropes lubricated with Texaco Crater, because Crater lubricates all the way through, works itself between the strands to protect against rust, dirt and abrasion.



6 CRAWLER MECHANISMS LAST LONGER with Texaco Track Roll Lubricant. It insulates against moisture, cushions shock, minimizes wear.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

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ROADS AND STREETS, April, 1959

Jones-Tompkins complete world's highest earthfill dam

**Allis-Chalmers Construction Machinery
Helped Beat High-Speed Schedule**

Sixteen million cubic yards of rock and fine conglomerate fill were piled 512 feet high to form the world's highest earthfill dam. J. A. Jones Construction Co. and Charles H. Tompkins combined their dirt-moving "know-how" to construct the record-breaking \$58,000,000 Swift Creek Dam on the Lewis River in Washington. Jones and Tompkins used

Allis-Chalmers torque converter crawler tractors and Allis-Chalmers motor graders for pioneering, spreading, compacting and grading. Bill Kennish, project superintendent, supplies the reasons why: "The Allis-Chalmers machines have proved themselves here where the going was really tough and the schedule even tougher."

The Swift Dam was a 30-month job—from turning the first earth to first delivery of power from its 204,000-kw generators. Electric power began to flow in December, 1958. The earth-moving operations finished 20% ahead of schedule.

The earthfill contract opera-

neering contract with Pacific Power & Light Company.

Borrowing and hauling operations were handled by draglines, shovels and trucks . . . pioneering, spreading and compacting by a fleet of Allis-Chalmers torque converter crawler tractors. Much of the dozing was done on steep slopes of the dam and the surrounding terrain. Allis-Chalmers motor graders maintained the heavily used truck haul roads. Daily earth moving and spreading production averaged 48,000 cubic yards—often reached 60,000 cubic yards.

The dam is 512 feet high, with a crest length of 2,100 feet and a base thickness of 1,950 feet.

Bill Kennish, project superintendent, paid tribute to Allis-Chalmers machines for their



Bill Kennish, project superintendent
Jones-Tompkins Construction Co.

CONTRACTORS ON THE JOB:

Bechtel Corporation
San Francisco
California

**J. A. Jones Construction
Co., Inc.**
Charlotte
North Carolina

Charles H. Tompkins Co.
Washington, D.C.

Jones-Tompkins
Headquarters:
Cougar, Washington

tion, a joint venture by Jones-Tompkins, was worked to plans and specifications of the Bechtel Corporation, San Francisco, which holds the design and engi-

...move ahead with



Jones and Tompkins used Allis-Chalmers torque converter crawler tractors to handle the tough dozing work on this, the world's highest earthfill.

"power, balance and especially trouble-free operation." He also commended his Allis-Chalmers dealer with the comment, "They have given us good service. We appreciate it. In remote locations like this, we simply cannot afford to gamble with equipment and service."

The excellent performance of Allis-Chalmers construction machinery, backed by outstanding Allis-Chalmers dealer service such as Jones-Tompkins has experienced, is yours, too. Your Allis-Chalmers dealer will recommend equipment. Arrange a demonstration...no obligation. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.



This Allis-Chalmers FORTY FIVE motor grader helped keep the Swift Creek Dam rising rapidly by keeping haul roads and fill in high-speed condition.



HD-21

225 net engine hp
Torque converter drive
56,260 lb
(approx. as
shown)

FORTY FIVE

127 hp
6 speeds forward to 20.6 mph
3 speeds reverse to 7.0 mph
23,800 lb (approx.)

ALLIS-CHALMERS...power for a growing world

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ROADS AND STREETS, April, 1959



Pick a pickup that's big-truck tough



Chevy's got 'em by the dozen!

The handiest helper you'll ever have is right here—one of these '59 Chevrolet pickups is bound to be just right for your work. It's ready to hop-to-it on your hurry-up chores with the power, the load capacity and the tough components that spell savings in time and money every run. Pick your pickup; then read all about it here:

Save up to 20% on fuel!

Choose any one of Chevy's 5 dashing Fleetside models or 7 handy Stepside models and you can count on extra savings right from the start. Each of these models offers the newly improved Thriftmaster 6 as standard equipment. With a new Economy-Contoured Camshaft, this engine assures up to *10% less fuel consumption*. And in Series 31 and 32, the Thriftmaster can be equipped with a new Maximum-Economy Option* that improves economy by an additional 10%! Or if you prefer a V8 engine, 2-wheel-drive models offer the power-packed performance and short-stroke efficiency of the advanced 160-h.p. Trademaster V8*.

Carry extra-big cargoes

There's room for everything in a '59 Chevy pickup

body! Smooth-lined Fleetside models provide big cargo areas in lengths of 78" or 98" and all are a full 6 feet in width. New Stepside models, with handy side running board, offer spacious bodies in 78", 98" and 108" lengths. And each of these new pickups comes equipped with ruggedly built gairtight tailgate and long-lasting select-wood floor with steel skid strips.

Haul anywhere with Chevy's new 4-wheel drive

It's the latest thing in 4-wheel drives, now available in either Fleetside or Stepside pickup models. With 2-speed power divider and precision-engineered front axle, it gives nearly twice the torque multiplication and up to *twice* the traction of 2-wheel drives. Powerful traction that digs right in and enables you to haul where you *couldn't* before—through deep mud, snow, swampy areas and up towering grades!

Light loads, big loads, long runs, short hops—whatever you haul and wherever you haul it, you're sure to find the right truck for your business in Chevy's long, strong and handsome line of pickups! The one for you is at your Chevrolet dealer's now. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

*Extra cost.

No job's too tough for a



MODEL 3104

Max. payload capacity 1,500 lbs.;
78" Stepside body.



MODEL 3154 (4-Wheel Drive)

Max. payload capacity 1,600 lbs.;
78" Stepside body.



MODEL 3134

Max. payload capacity 1,400 lbs.;
78" Fleetside body.



MODEL 3184 (4-Wheel Drive)

Max. payload capacity 1,500 lbs.;
78" Fleetside body.



MODEL 3204

Max. payload capacity 1,300 lbs.;
98" Stepside body.



MODEL 3604

Max. payload capacity 2,000 lbs.;
98" Stepside body.



MODEL 3654 (4-Wheel Drive)

Max. payload capacity 2,100 lbs.;
98" Stepside body.



MODEL 3234

Max. payload capacity 1,300 lbs.;
98" Fleetside body.



MODEL 3634

Max. payload capacity 2,000 lbs.;
98" Fleetside body.



MODEL 3684 (4-Wheel Drive)

Max. payload capacity 2,700 lbs.;
98" Fleetside body.



MODEL 3804

Max. payload capacity 2,600 lbs.;
108" Stepside body.



MODEL 3854 (4-Wheel Drive)

Max. payload capacity 2,700 lbs.;
108" Stepside body.

AND EL CAMINO, TOO!

The year's brightest new idea in trucks, a striking combination of high fashion and husky components, with 1,150-lb. payload capacity and 119" wheelbase. Good looks never carried so much weight!



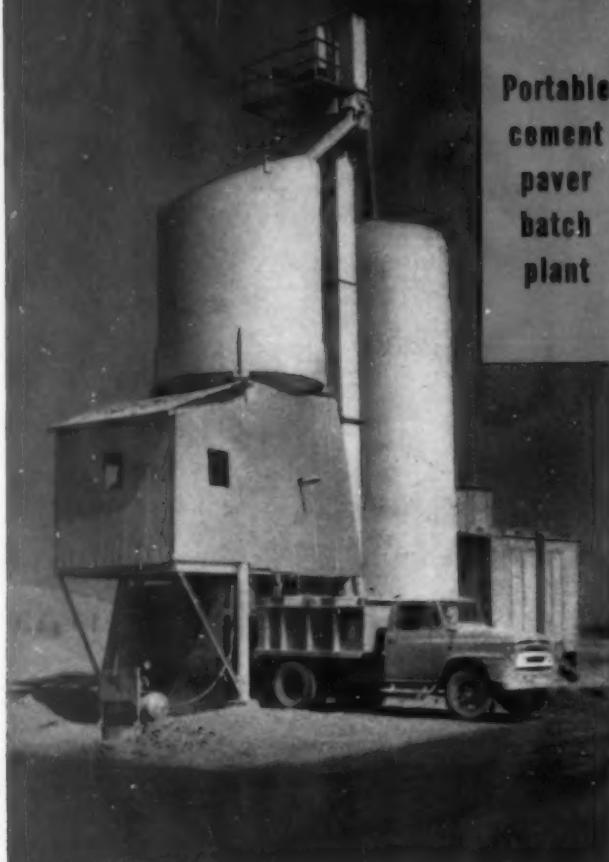
Chevrolet Truck!



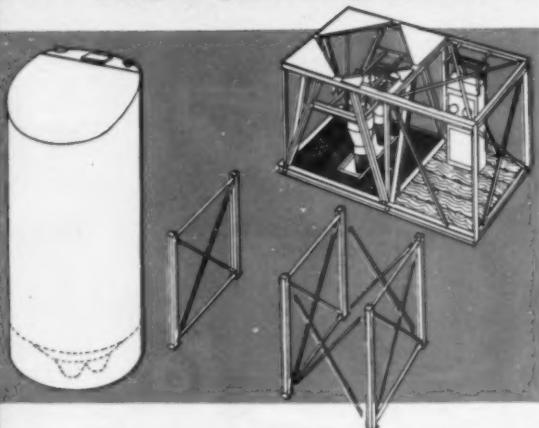
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ROADS AND STREETS, April, 1959

NOW Johnson brings you...the AUTOMASTER-C



Portable
cement
paver
batch
plant



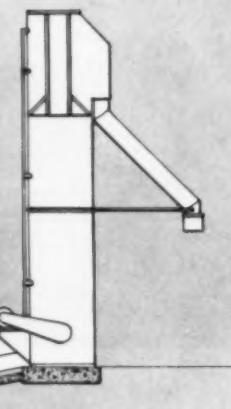
Quick, easy "stack-up" assembly —

On today's high-production paving schedules, it's extremely important to keep your trucks running on shortest possible hauls between plant and pouring area. Often, relocating the plant saves additional investment in expensive transit-mix or batch trucks. So, here's the portability you need, in a new cement batch plant that's simple to move . . . ready to work in a hurry on arrival at new location! Everything is pre-assembled into a minimum number of units: single-unit batcher section; silo with built-in aeration system; and easily-erected supporting columns. Batchers, dial scales, mix selector, graphic recorder all remain intact in one unit. No complicated dismantling, re-assembly or field wiring. Master electric control panel has simple plug-in connections for quick cable hook-up to elevator and screw conveyor motors.

A completely new series of portable AUTOMASTER cement and aggregate plants now available for any 1, 2, or 3-stop operation. Get top hourly production on your paving jobs — team these Johnson AUTOMASTER plants with Koehring® twinbatch® pavers!

Here's another time-saver for paving contractors—

Low-cost Johnson bulk cement transfer plant unloads railway hopper cars, loads trucks at approximately 500 bbls. per hour with adjustable screw at 10° incline — (600 BPM with screw level). Choice of gasoline or electric power.



c. s. JOHNSON co., Champaign, Ill. • Stockton, Calif.

(Division of
Koehring Co.)

... for more details circle 336 on enclosed return postal card

ANOTHER pneumatic-tire roller from Buffalo-Springfield...

NEW

**PSR-9 with
3 to 10 tons
of
compaction
load on
9 wheels!**



Variable-weight: 720 to 2270 lbs. per wheel

- Compacts all courses of flexible-type pavements: sub-base, base, surface materials.
- All wheels oscillate for contour compaction — 1-in. tire overlap gives 100% surface contact.
- Positive 4-wheel drive through twin propeller shafts (one to each pair of driving wheels).
- Shafts transmit power direct from bevel-gear differential to final drive case at wheels.
- Smooth starts, stops, reversing — infinite speed selections to 15 mph forward, reverse.
- Speed changes controlled by hydraulic power shifting through a 3-range, full-reversing transmission, and torque converter.
- Automotive power-steering, 4-wheel hydraulic brakes, mechanical parking brake, plus . . .
- . . . low center of gravity, assure maximum operating ease, stability and safety along shoulders, elevated curves, steep grades.

Good operating visibility, too — 360° swiveling seat. Frame design keeps the guide and drive wheels in view.

Here are some interesting new developments in the field of pneumatic-tire compaction. Just recently, a big, self-propelled roller in the 10-30 ton class was introduced by Buffalo-Springfield®. Now comes a 3-10 ton self-propelled PSR-9, setting a new, high "standard of comparison" for quality, performance, durability in the medium-weight class. Take a look at its *performance-plus* features listed here — then get the complete story from your Buffalo-Springfield distributor. *Why wait?* Call him about it *today*.

BIG PSR-30 gives you 10 to 30 tons of compaction load on 7 pneumatic tires. Variable-weight wheel loads range from 3340 to 8600 lbs. per wheel to suit various material and density requirements. Speed range: from 0 to 19.4 mph through smooth torque-converter drive, 3-range full-reversing transmission.

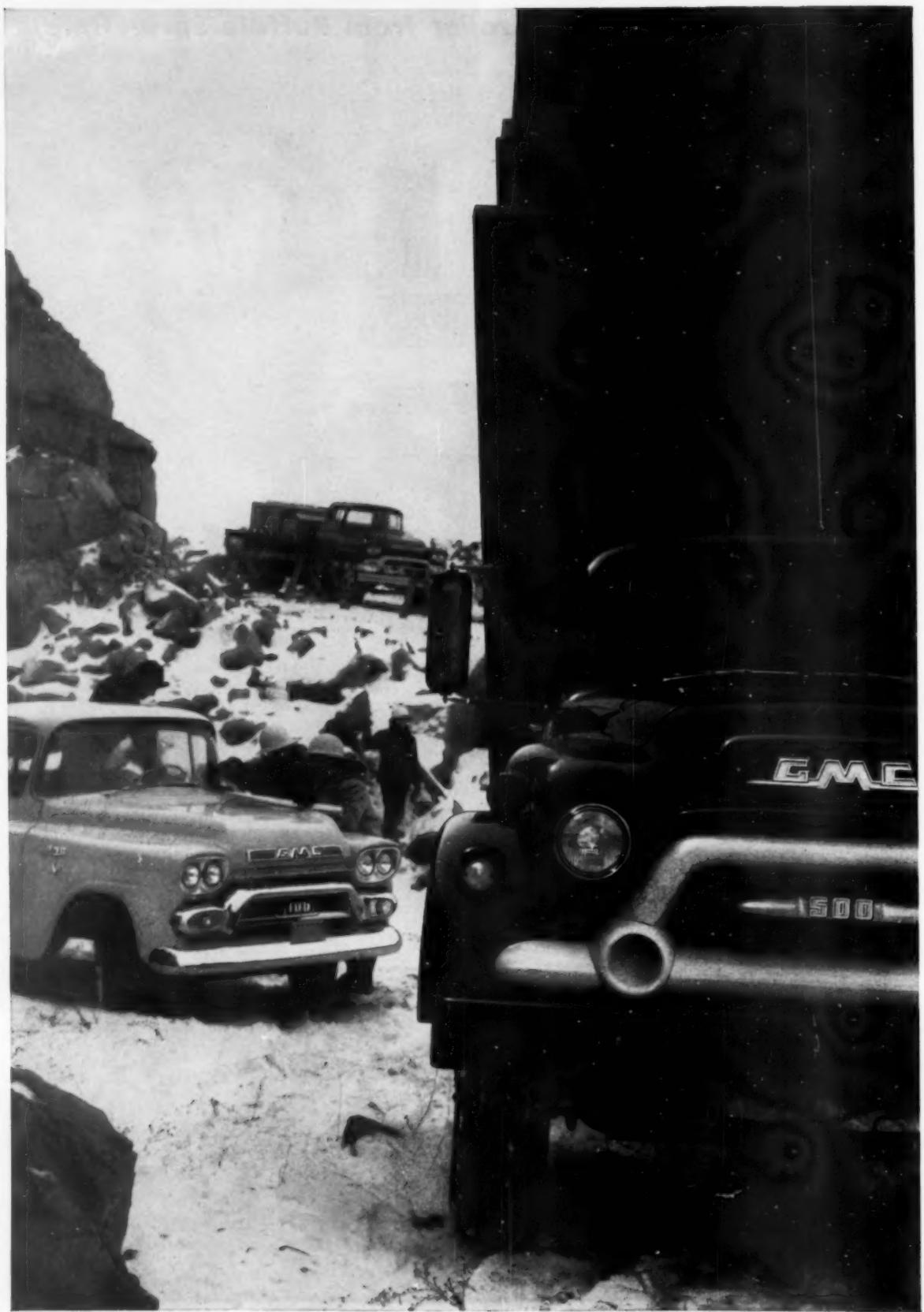


BUFFALO-SPRINGFIELD ROLLER CO.

SPRINGFIELD, OHIO

DIVISION OF KOEHRING COMPANY

. . . for more details circle 375 on enclosed return postal card



GMC OPERATION “HIGH GEAR”

brings you the
greatest money-saving, money-making
construction trucks ever built!

Operation "High Gear" is the biggest engineering, design and quality-control program ever known! It's an entirely new concept in modern truck transportation, backed by the keenest brains and manufacturing know-how

in the business! Results: New truck values, new dependable endurance, new low operating and upkeep costs. See your GMC Dealer for proof, today. GMC Truck & Coach—a General Motors Division.



NEW! LASTING LOW-COST POWER

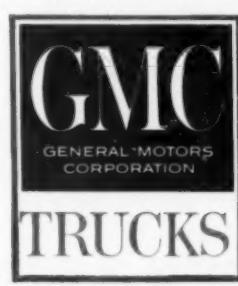
Now you can get the most economical diesel in any construction truck—the new GMC 6-71SE two-cycle power plant. This fuel-saving champ has exclusive economy range governor and automatically controlled fan. Available with 189 or 210 H.P. Other GMC engines include economical, powerful V-8's and Sixes.

NEW! TRUE-TRUCK FEATURES

For the rough, tough usage of construction trucks, GMC has installed strongest front crossmembers, new extra-heavy-duty clutches, bigger brakes and stronger prop shafts. In many models you also get these GMC Extra-Value features at no extra cost—M-400 bearings that last seven times longer, standard synchromesh transmissions and the easiest mechanical steering, recirculating ball-type.

NEW! SPECIALIZED CONSTRUCTION MODELS

Any size, any shape! Conventional and COE design, world's biggest selection of six-wheelers, complete line of pickups including new Wide-Side and 4 x 4 models, new FW550 six-wheelers with 46,000 lbs. GVW designed specifically for 6-7 yard mixers and 10-cubic yard dumps even in states with 32,000-lbs. axle laws, plus 13 special off-highway models with up to 63,000 lbs. GVW.



From $\frac{1}{2}$ -ton to 45-ton . . .
General Motors leads the way!

Watch for more great truck advances from GMC!

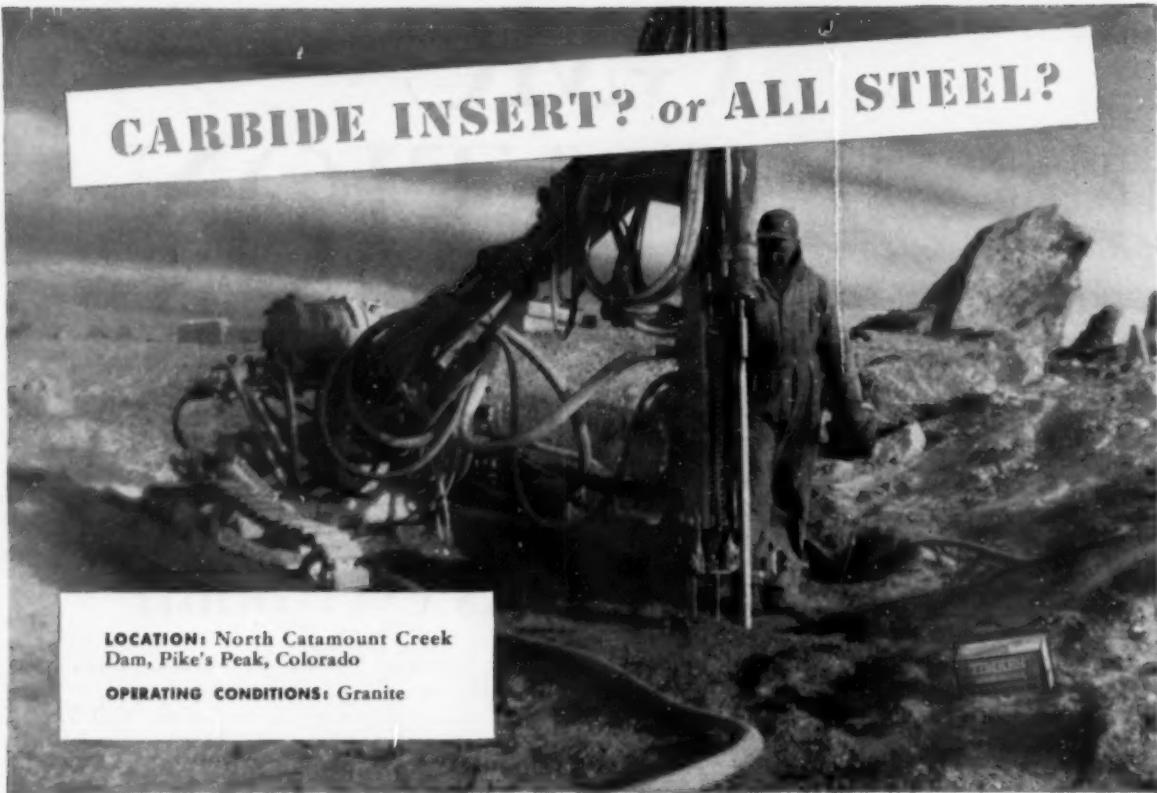
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ROADS AND STREETS, April, 1959

CARBIDE INSERT? or ALL STEEL?

LOCATION: North Catamount Creek Dam, Pike's Peak, Colorado

OPERATING CONDITIONS: Granite



Colorado Constructors Inc. reports...

"Drilling speed up 5%, feet of hole-per-bit up 10% with TIMKEN® carbide insert bits"

DRILLING through granite at the foot of Pike's Peak on a big dam job, Colorado Constructors Inc. selected Timken® carbide insert bits. They report that Timken bits gave them a 5% increase in drilling speed, plus 10% more feet of hole-per-bit.

You get results like that with Timken carbide insert bits in hard, abrasive ground. Their five front holes and deeper wing clearance help speed chip removal. Bits work more at drilling rock, less at "drilling" chips. And the tough, special analysis carbides last longer, help give more feet of hole-per-bit.

In ordinary ground, Timken all steel bits can save you more.

With correct and controlled reconditioning, they give you lowest bit cost per foot-of-hole when you can drill out full increments of steel.

Whatever type of Timken bit you use—whatever your drilling conditions—you'll save time and money. They're all interchangeable in the same thread series. Your drillers can change bits as fast as the ground changes without the trouble of changing drill steels.

Timken bits are made from our own electric furnace fine alloy steel. We're the only American maker of removable rock bits that takes the extra step of making its own steel. And the special shoulder union developed by the Timken Company

gives extra protection to threads against drilling impacts.

Let us help you get the most economical—the right bit for all your drilling jobs. Call or write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.



Timken threaded all steel multi-use rock bit



Timken threaded carbide insert rock bit

TIMKEN®

your best bet for the best bit for every job

... for more details circle 366 on enclosed return postal card



Washington News Letter

Exclusive - By Duane L. Cronk, Director, Highway Information Services

April 10, 1959

There is increasing pressure to have provision made on urban Interstate expressways for new transit facilities, the Bureau of Public Roads admits. BPR Commissioner Ellis Armstrong told an audience in Washington last month that the precedent has been set with approval of the dual-purpose Northwest Expressway in Chicago. Provision is made in this new urban Interstate road for rapid transit down an unusually wide median strip.

And in Washington, D.C., transportation planners are incorporating rapid transit on highway right-of-way plans. Some planners also hope the federal government will OK use of the 90% Interstate money for right-of-way.

BPR officials are still cagey about the idea and point out that rapid transit will not be approved on Interstate rights-of-way unless it can be designed so as not to interfere with the traffic flow of the highway. In the Chicago project, Armstrong said, the combination facility was "an obvious and a good solution to a difficult problem."

The Washington planners claim that it will cost little (if anything) more to buy the wider strips of land necessary to provide for transit. They point out that if provision is made only for new highways to carry the increased traffic foreseen for the future, downtown streets will soon be loaded beyond capacity and tremendous outlays will be required for parking. Most officials in Washington are in agreement that in urban areas, expressways alone will complicate rather than solve the traffic problem.

* * *

Two major studies on fundamental highway subjects have been completed by the U.S. Bureau of Public Roads. One delves into the controversial area of who should pay for the new highways. The other explores the traffic safety problem and recommends what role the federal government should play in efforts to reduce the death toll on American highways. Both are stimulating plenty of discussion here.

The highway cost allocation study is a progress report - one of a series which Congress requested to guide it in its consideration of ways to finance the multi-billion-dollar National Highway Program. This one deals with traffic trends and benefits of highway system development to other than highway users. The final report will be based on findings of the AASHO test road.

The BPR found that traffic will increase at a continuing rapid pace for years to come, creating a growing load upon the nation's roads and streets. Whereas

(continued on next page)

there were 77 million vehicles on the road in 1957, there will be 114 million vehicles by 1976, rolling up a record total of 1.2 trillion miles annually. Population growth, widespread automobile ownership and popularity of automotive travel, along with intensive development of the highway transportation industry, will all combine to pose a tremendous challenge to highway and traffic engineers.

Non-users as well will benefit from the completion of new highways, the BPR researchers found. This is an area that has not been probed deep enough, heretofore, and the new research is producing plenty of evidence that as highway transportation becomes more deeply ingrained in the pattern of national economic life, the benefits of highway system development become general and diffused.

Such revelations of the general benefits of new highways, as well as those realized by specific industries, will help Congress to recognize anew the need for long-range highway programming, and help in devising a sound tax program to support the nation's greatest internal improvement program.

* * *

The Bureau's safety study has already been widely publicized in the general press, and inevitably some results erroneously reported. Many newspapers gave the impression that the study proved that high speeds are not nearly so responsible for traffic accidents as has been considered heretofore. The facts are that this finding came out of experience on wide-open rural sections of superhighways (such as the toll roads) specifically designed to carry fast-moving automobiles safely. It by no means indicates that high-speed travel is safe on other segments of the nation's generally inadequate and under-designed highways.

But there were other major findings from the two-year safety study with implications for highway engineers to appraise. For examples:

- Twice as many accidents occur during the night than during the day. Is this grounds for more widespread inclusion of lighting and other night-time safety devices in highway design? An important point for further study.
- Controlled-access highways average at least $2\frac{1}{2}$ times safer than other roads, and in some cases their fatality rates are only one-fifth the national average. Officials who have been inclined to compromise high design standards to give in to local pressure for access, might think twice about this one.

Finally, the safety experts came up with an impressive argument for completion of the Interstate System. They estimated the total economic loss to the nation from traffic accidents at \$5.4 billion last year alone. In other words, traffic accidents cost the equivalent of a $12\frac{1}{2}$ cents gasoline tax per gallon!

* * *

New highway bills in the hopper: Congressman George Fallon, chairman of the House Subcommittee on Roads, has introduced a bill which would extend for one more year the 1958 estimate of cost of completing the Interstate System as the basis of future apportionments. . . Fifteen senators are asking \$125 million in federal aid to pave the 1,331 mile Alaska Highway. Canada would match the funds, 50-50. Only about 300 miles of this land link with Alaska is hard-surfaced now.

. . . Meanwhile, the Administration finally found someone who would introduce its federal gasoline tax increase proposal . . . Senator Richard Neuberger, a Democrat.

B.F.Goodrich



B.F.Goodrich Rock Service tires reduce delays, save contractor up to \$600 per hour

WESTERN CONTRACTING CORP. operates 2,000 vehicles to build highways, dams and air bases all over the country. Here the job is earthmoving for a new runway at Wright-Patterson Air Force Base, Fairborn, Ohio. The scraper above carries loads as heavy as 50 tons, works 22 hours a day. The tires are new B.F.Goodrich Rock Service, chosen because they substantially increase hours of service and reduce delays due to tire failure. Avoiding these delays saves the company \$300 to \$600 per hour in downtime expense.

Look at the husky double chevron Rock Service tread. It bites in to give maximum traction and resist side-

slippage in forward or reverse. The B.F.Goodrich FLEX-RITE NYLON cord body withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. This Rock Service body outwears even the extra-thick tread, can be retreaded over and over!

If you do earthmoving it will pay you to see the new Rock Service tire at your B.F.Goodrich Smileage Dealer's. He has a tire for every type of construction work. You'll find his address under Tires in the Yellow Pages of your phone book. *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment

Enter the B.F.Goodrich Truck Tire Mileage Contest. You can win a Thunderbird or Corvette or one of 310 other prizes. See your B.F.Goodrich dealer for entry blanks.

B.F.Goodrich



Smileage!

B.F.Goodrich off-the-road tires

NEW



LINK-BELT SPEEDER LS-78 SHOVEL-CRANES

**change the ground rules
for 3/4-yd. performance!**



Bold new base-to-boom engineering!

Every move is an exciting demonstration of performance that writes a new set of ground rules for what a $\frac{3}{4}$ -yd. shovel-crane should do! The all-new engineered LS-78 has the look and feel of stamina and strength. And it's out to let you know it with perfect balance of power, weight, speed and control. Precision-built, fully convertible, attractively priced . . . the bold new LS-78 creates dozens of new ways to widen your profit margins!

Power controls for the man-in-command

LS-78's exclusive Speed-o-Matic power hydraulic controls quicken cycles (up to 25%) spurt output, side-step operator fatigue. Split-control stand gives unobstructed vision of below-grade excavating. Flick-of-the-wrist levers trigger instantaneous, oil-smooth response. No jump, jerk or lag. From start-up to shut-down, your man-in-command stays mid-morning fresh. He's encouraged to push the LS-78 to its highest productive peak!

Full-Function Design tailors LS-78 to your job!

An independent power train flow for each machine function . . . bridges all restrictions of non-independent power trains. It offers more exclusive standard features, a wider choice of optional features that can be operated *simultaneously* without restricting *any other* function. Factory or field-install function-adding features you need anytime . . . today, tomorrow, next year.

time and motion engineered to help you profit more from men, minutes and machines

LINK-BELT SPEEDER

Link-Belt Speeder Corp., Cedar Rapids, Iowa

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ROADS AND STREETS, April, 1959



See your distributor for details and fact-finding catalog . . . or write direct:

How to estimate ground-water discharge of Beth-Cu-Loy subsurface drainage pipe

**Use simple formula, or
nomograph on opposite page**

You can easily minimize ground water dangers by the proper use of subsurface drainage structures made from galvanized corrugated Beth-Cu-Loy sheets. Pipe for this purpose is perforated to permit excess ground water to trickle in and run off to a predetermined point of deposit. But—since the size of your subsurface pipe depends on the amount of ground water to be handled—how do you estimate the potential runoff?

In plotting ground-water discharge under a variety of subsurface conditions, many engineers have been using the simple formula shown at the right.

$$Q = \frac{C \times L \times W}{43,560}$$

where

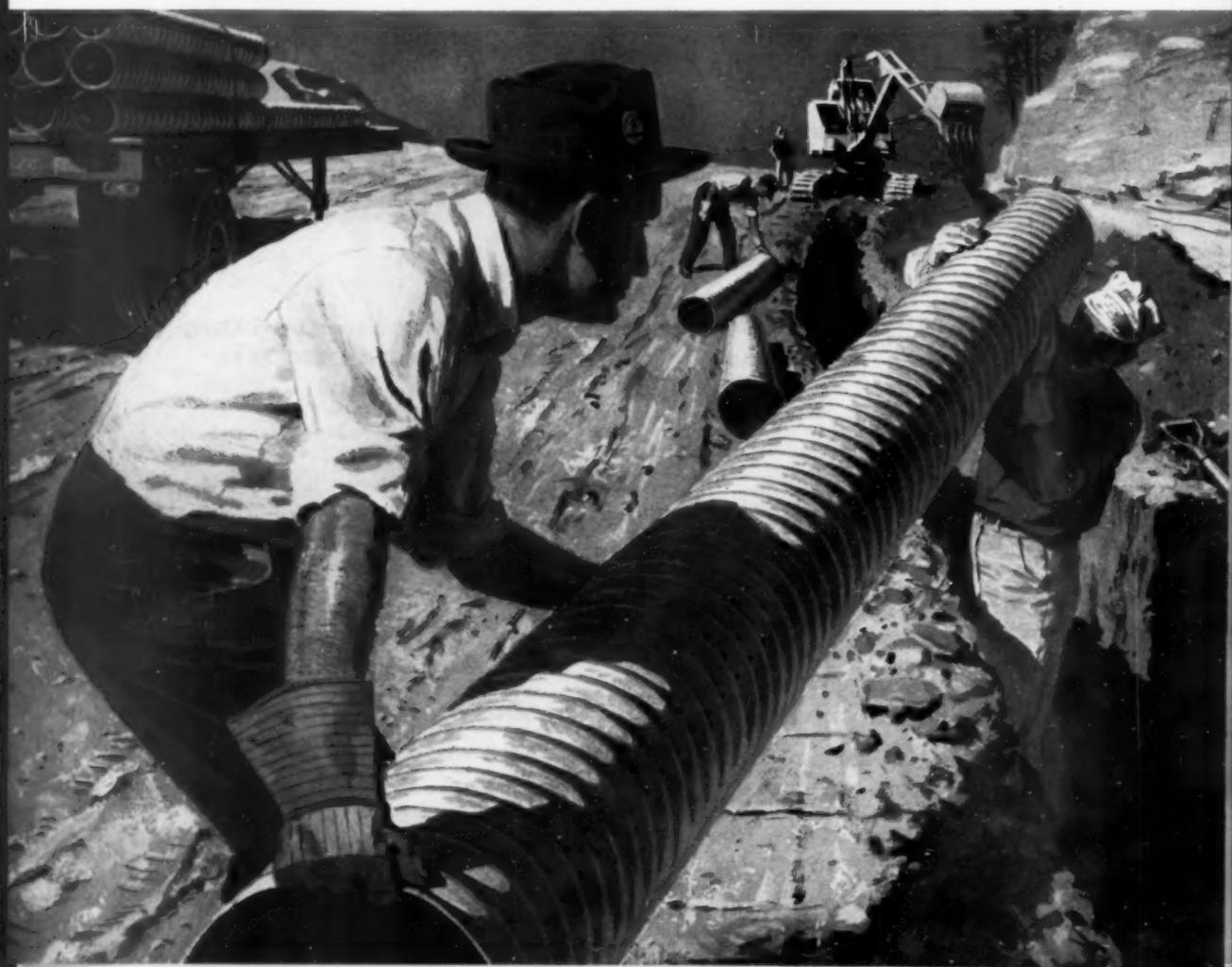
Q = quantity of water in cu ft per sec for each perforated pipe

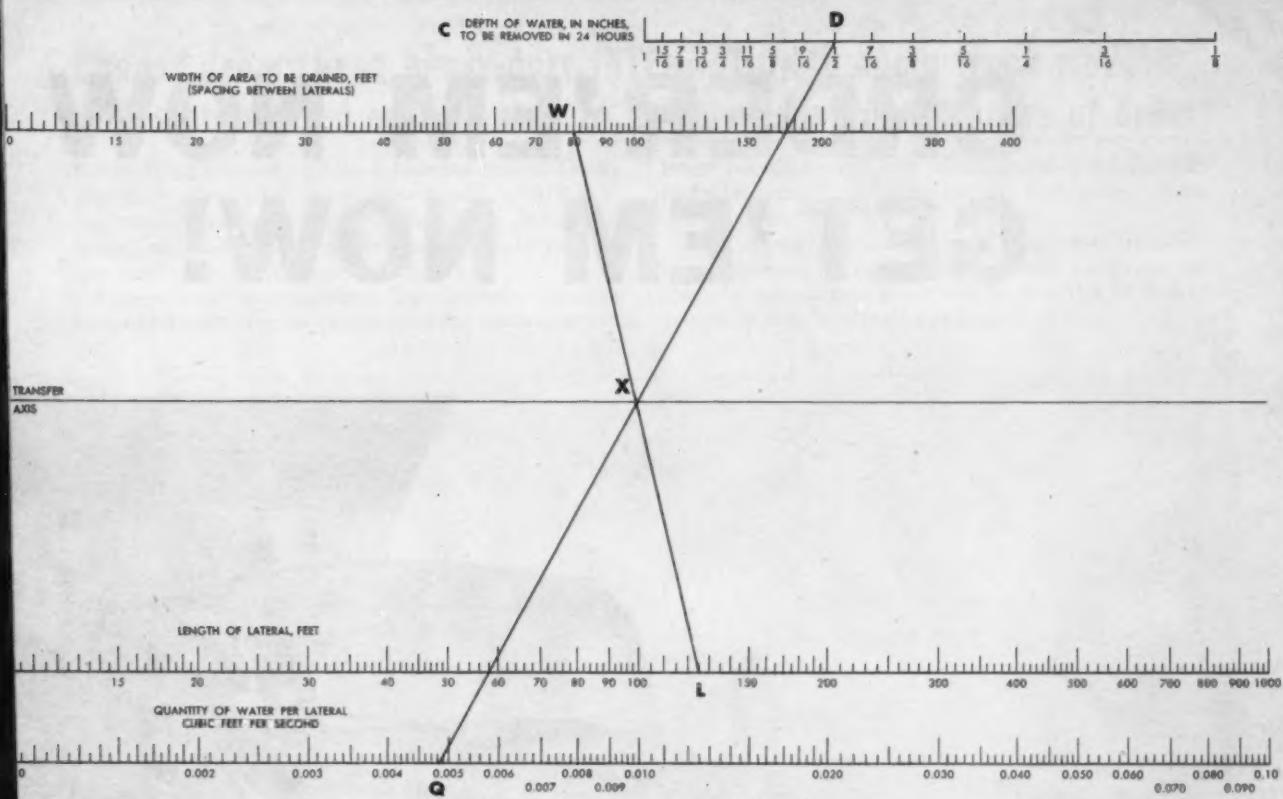
L = length of perforated pipe in feet

W = width of area to be subdrained*

C = a constant representing depth of ground water (in.) to be subdrained in 24 hrs (refer to table on opposite page for value of "C" to obtain cu ft per sec per acre. Your soils man can help in analyzing soil permeability and estimating the depth of water to be removed).

*One pipe only, not a network of drains.





How To Use This Nomograph

TABLE—CONSTANT C (Subsurface Runoff in 24 Hours)

Soil Permeability Type	Depth in.		Quantity of Water Per Lateral (cubic feet per second per acre)
	Fraction	Decimal	
Slow to Moderate	1/16	0.0625	0.0026
	1/8	0.1250	0.0052
	7/16	0.1875	0.0079
	1/4	0.2500	0.0105
Moderate	1/8	0.3125	0.0131
	3/8	0.3750	0.0157
	7/16	0.4375	0.0184
	1/2	0.5000	0.0210
	9/16	0.5625	0.0236
Moderate to Fast	1/4	0.6250	0.0262
	1 1/16	0.6875	0.0289
	3/4	0.7500	0.0315
	1 3/16	0.8125	0.0341
	7/8	0.8750	0.0367
	1 5/16	0.9375	0.0394
	1	1.0000	0.0420

If you prefer to avoid arithmetical calculations, you'll find the nomograph a time-saver. Let's follow an example to see how the graph works out. Assuming an area-width (W) of 80 ft, and the length of the pipe lateral (L) to be 125 ft, draw a straight line (WL) between these points through the transfer axis line, thus establishing point X.

Let us further assume that your local soils technician has estimated that $1\frac{1}{2}$ in. of water is the depth to be drained in any 24-hr period. Draw another straight line from the $1\frac{1}{2}$ figure at point D, down through X, and extend it to the quantity line at Q. The reading at point Q shows that 0.0048 cu ft per sec of water can be expected through the lateral pipe.

Your Fabricator Can Help at This Point

With this information, your pipe fabricator can help you determine the size of pipe needed to handle the flow.

Pipe made from Beth-Cu-Loy galvanized corrugated steel sheets is ideal for subdrainage applications. It's strong, light in weight, long-lasting, and economical. Flexible, too. In all respects, it meets the rigid specs of the American Association of State Highway Officials.

Bethlehem makes only the Beth-Cu-Loy (copper bearing steel) sheets, not the pipe itself. Consult your fabricator for details on this versatile material.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

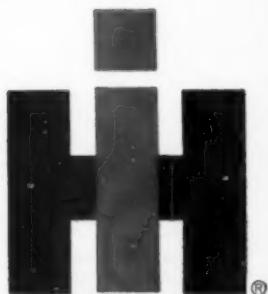
BETHLEHEM STEEL

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WORLD'S MOST COMPLETE LINE



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Choose from these heavy-duty INTERNATIONAL dump truck models... with standardized equipment... to be shipped within 24 hours of order!

No waiting! If you call your INTERNATIONAL Dealer now he'll place your order immediately with INTERNATIONAL's Truck Sales Processing Center. Within 24 hours your truck can be shipped from this factory inventory pool ready to roll under the shovel.

Choose from INTERNATIONAL TRUCK conventional or compact-design models equipped with bodies, hoists,

frame reinforcements, tow hooks, double-faced front directional signals, rear view mirrors both sides, heater-defrosters and oil filter.

Your choice of optional body equipment including cab protectors, extension sides, swinging partitions and spreader aprons as ordered will be installed at factory inventory pool in a matter of hours!



A full range of models to meet your exact need!

	Single Rear Axle			Tandem Rear Axle	
Model Series	164	182	184	182	192
Gross Vehicle Rating	19,000	21,000	23,500	33,000	38,000
Body	4 Yd.	4 Yd.	4 Yd.	8 Yd.	8-10-Yd.
Wheelbase	129 in.	141 in.	141 in.	149 in.	157 in.
Engine	264 cu. in.	308 cu. in.	308 cu. in.	308 cu. in.	450 cu. in.
Transmission	4-speed Synchro-mesh	5-speed Direct	5-speed Direct	5-speed Direct, 3-speed Auxiliary	5-speed Direct, 3-speed Auxiliary
Rear Axle and Capacity	15,000 2-speed	16,000 2-speed	18,500 2-speed	28,000 single- reduction tandem	34,000 single- reduction tandem
Tires	8.25 x 20 10 ply	9.00 x 20 10 ply	10.00 x 20 12 ply	9.00 x 20 10 ply	9.00 x 20 10 ply
Frame Reinforcements	Inverted "L"	Inverted "L"	Inverted "L"	Inverted "L"	Inverted "L"
Heavy Duty Springs	Yes	Yes	Yes	Std.	Std.

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ROADS AND STREETS, April, 1959

How to get more tractor for your dollar

Advantage	What it means to you
All-steel main frames	Power train protection Better equipment mounting Better weight distribution
Permanent lubrication of truck wheels, idlers and support rollers	No more wasted time greasing these track components
Torque converter drive	Matches power to load automatically Transmits power smoothly Less shifting
Double reduction final drives	More clearance Longer gear life
True unit construction	Faster service Easier access to all major assemblies



New standards for crawler tractors—
from 66.5 to 225 hp

move ahead with **ALLIS-CHALMERS** .

In the chart below are five important crawler tractor advantages. These features have earned recognition by all makers of crawler tractors—one or more are now included in their latest designs. It stands to reason that the more of them you get on your next crawler, the more it is worth to you.

Where you get it

Allis-Chalmers is the only manufacturer offering main frames in *all* models. Two other manufacturers now offer them in one model.

Allis-Chalmers is the only manufacturer offering permanent lubrication of truck wheels, idlers and support rollers on *all* models. One other manufacturer offers permanent lubrication on three models.

Allis-Chalmers pioneered it in crawler tractors in 1940 . . . offers it in two tractor shovel models, two tractor models. All other major manufacturers now offer it as optional equipment in one or more models.

Allis-Chalmers is the only manufacturer offering double reduction final drives on *all* models. One other manufacturer offers it on three models.

Allis-Chalmers is the only manufacturer offering true unit construction in *all* its models. Two other manufacturers now offer modified unit construction in part of their lines.

Here's proof that other manufacturers of crawler tractors have chosen to "follow the leader" with Allis-Chalmers engineering . . . and that your Allis-Chalmers dealer is the man to see for top value in crawler tractors. He'll be glad to demonstrate the model of your choice. It will have more industry-approved advantages than any other unit near its size. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.



power for a growing world

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ROADS AND STREETS, April, 1959

PERSONALS

ERNEST T. PERKINS, chief of planning, traffic and design, is retiring from the Connecticut state highway department after nearly 32 years of service.

Mr. Perkins has been active in the Highway Research Board as chairman of the project committee on guard rails and guide posts and as a member of the rigid pavement committee. He is a member of the ARBA committee on steel in concrete pavements. He will join a consulting engineering firm in New York.

WALTER V. BUCK, regional engineer for the U. S. Bureau of Public Roads at Kansas City, has retired after 25 years' service with the Bureau and 48 years as a professional civil engineer. He is a former state highway engineer of Kansas.

Mr. Buck originally set up the basic organization for the engineer-

ing department of the Kansas Highway Commission. His latest honor was an engraved silver tray presented by the Contractors Association of Kansas, in appreciation for his dedicated service to highways.

FREDERICK CULVER, presiding judge, Buchanan County Court, St. Joseph, Missouri, is elected president of the Highway Engineers' Association of Missouri. He succeeds John J. Leslie, St. Louis County highway engineer.

RICHARD A. WETZIG, of Ferguson & Edmondson Company, Pittsburgh, Pa., is the new president of the Contractors Association of Western Pennsylvania. Frank Mashuda, of the Frank Mashuda Companies Associated, Evans City, Pa., is vice president.



Richard A. Wetzig

EDWARD L. PINE has been appointed state highway engineer of Nevada, and W. O. Wright assistant state highway engineer.

Mr. Pine succeeds H. D. Mills who remains as a special consultant. Wright takes over from W. T. Holcomb who resigned recently to enter industry.

Mr. Pine was formerly secretary-manager of the Nevada chapter, Associated General Contractors, and Secretary of the State Contractor Board.



***Sand would scrape
the markings off
most tapes!***

This is Lufkin's Super HiWay®. Engineers and layout men swear by it. The big reason: it has a Chrome Clad® line that defies defacement . . . by sand, mud, grit or years of use.

Raised markings and protective borders are a part of the tape itself . . . and will last as long. The line is .025" thick with a rust-resistant base coat and a series of electroplatings, topped by a final layer of tough chrome. It's the most durable tape line made.

Available in 100', 200' and 300' lengths, with or without reels. Three choices of end markings plus chainman's conversion rule.

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Gasoline, Diesel, or LP Gas—New Multi-Range 6-cylinder engines for the International 460 Utility—gasoline, Diesel, LP Gas—deliver 61 hp at the flywheel, 48 at the drawbar.

New International® 460 Utility tractor

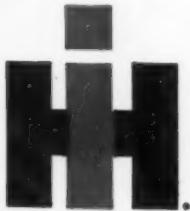
...SMOOTH 6-CYLINDER POWER

with brawn to match!

Add new Multi-Range 6-cylinder power to International's traditional built-in brawn . . . you literally step into a *new world of utility tractor performance!*

Here's sensationally SMOOTH power, virtually vibration-free, to lessen operator fatigue and thus step up daily output. It's *economical* power, because new Multi-Range design delivers remarkable fuel economy at every load range. It's *flexible* power, with instant governor response to load demand at any engine speed from 900 to 1,800 rpm. And it's power, *balanced* with built-in brawn, that delivers over 48 drawbar horsepower for the widest range of heavy-duty utility tractor work.

Ask your IH dealer to demonstrate the new 460 Utility . . . or others in the complete International line, 12.8 to 72.5 bare engine hp. For free catalog, or name of your nearest IH dealer, write International Harvester Company, Dept. RS-4, P. O. Box 7333, Chicago 80, Illinois.



See Your
**INTERNATIONAL
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International Harvester Company products pay for themselves in use—Farm Tractors and Equipment . . . Twine . . . Commercial Wheel Tractors . . . Motor Trucks . . . Construction Equipment—General Office, Chicago 1, Illinois



Built-in brawn means tractor strength and stamina to handle big buckets on heavy-duty International Pippin or International Wagner backhoes—sizes for trenching to grade 10, 12½, or 13¼ feet deep.



New Fast Reverser Unit speeds up shuttle-type operations. In each of five gears, the reverse speed is 22 per cent faster than the forward speed in that gear.

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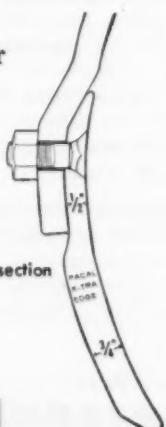
PACAL

x-tra-edge blades

See the extra steel in the Pacal X-TRA-EDGE hardened center section. This new design provides extra working steel right under the greatest weight of the machine. It resists crowning and blade metal waste is kept to a minimum. Users tell us of as much as six times longer wear, up to 40% lower blade costs . . . used in winter and summer; on maintaining gravel roads or pavement, on shoulder maintaining, on snow and ice removal, on oiling and road mixing or blacktopping. It pays to use PACAL X-TRA-EDGE BLADES.

Accurately punched for all makes.
Write or call for details.

Also available
 $\frac{3}{8}$ " heavy duty section
with $\frac{5}{8}$ " top



All steels furnished by Pacal made in U.S.A.

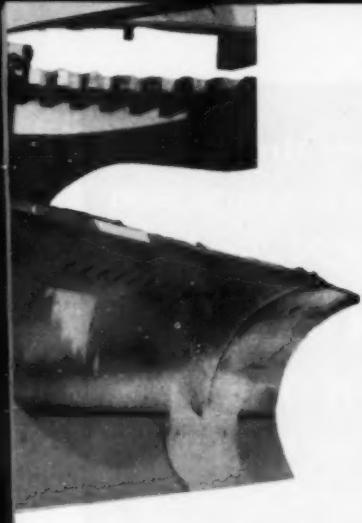


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PAPER, CALMENSON and Company

County Road B and Walnut Street adjoining Highway 36, St. Paul 13, Minnesota
Telephone: Midway 6-9456
Branches in Duluth, Minn. and Billings, Mont.

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County Highway Official, Missouri—"Pacal $\frac{1}{2}$ " to $\frac{3}{4}$ " x 8" special hardened blades giving about 5 times more wear than $\frac{1}{2}$ " x 6" blades."

County Highway Official, Minnesota—"380 hours on machine before blades were worn out."

County Highway Official, Iowa—"After one year's use new Pacal blades have saved our county 40 to 50% in blades and bolt costs."

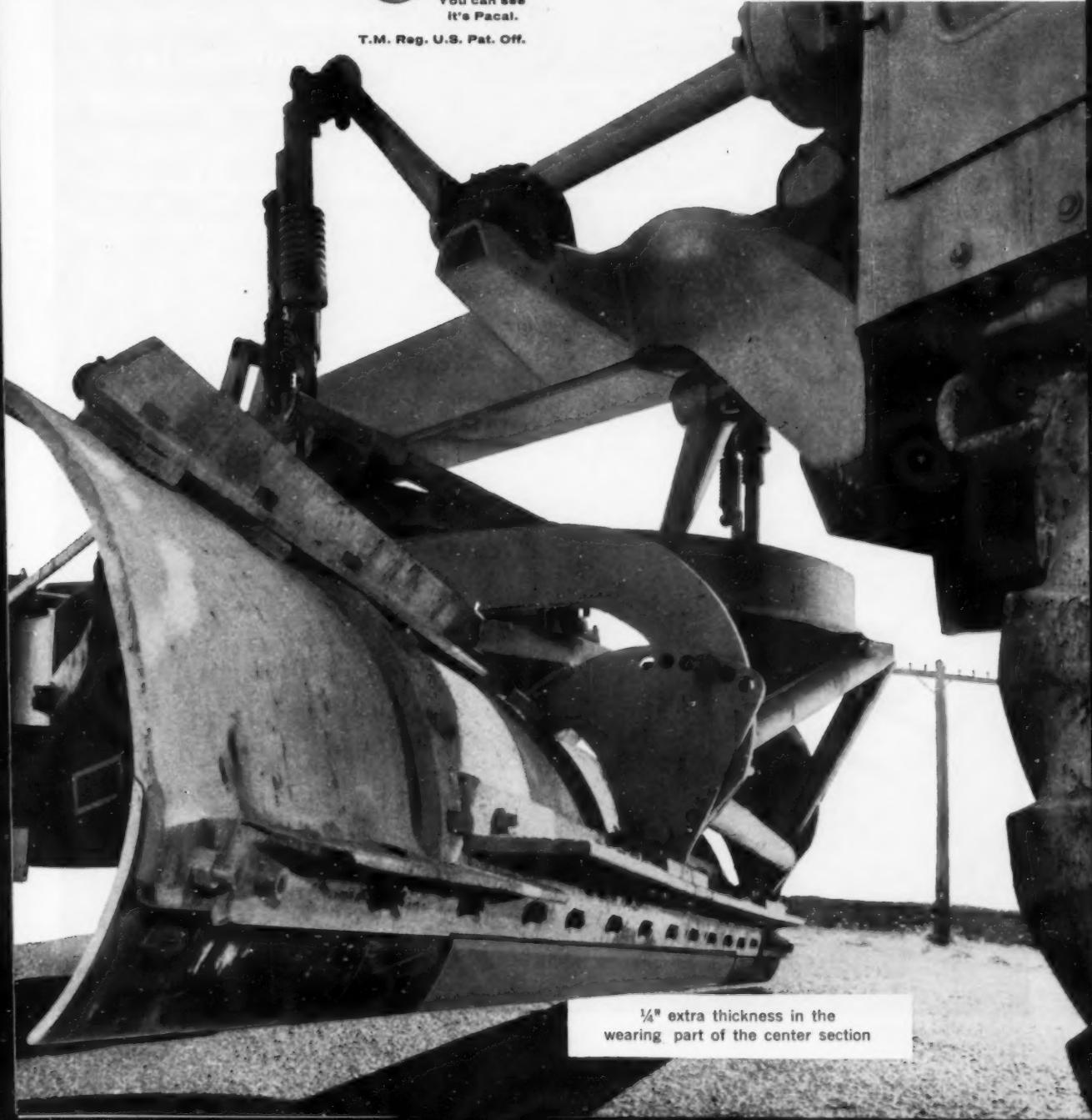
County Highway Engineer, Iowa—"Special hardened blades very satisfactory here. Switching to this three-piece arrangement 100%."

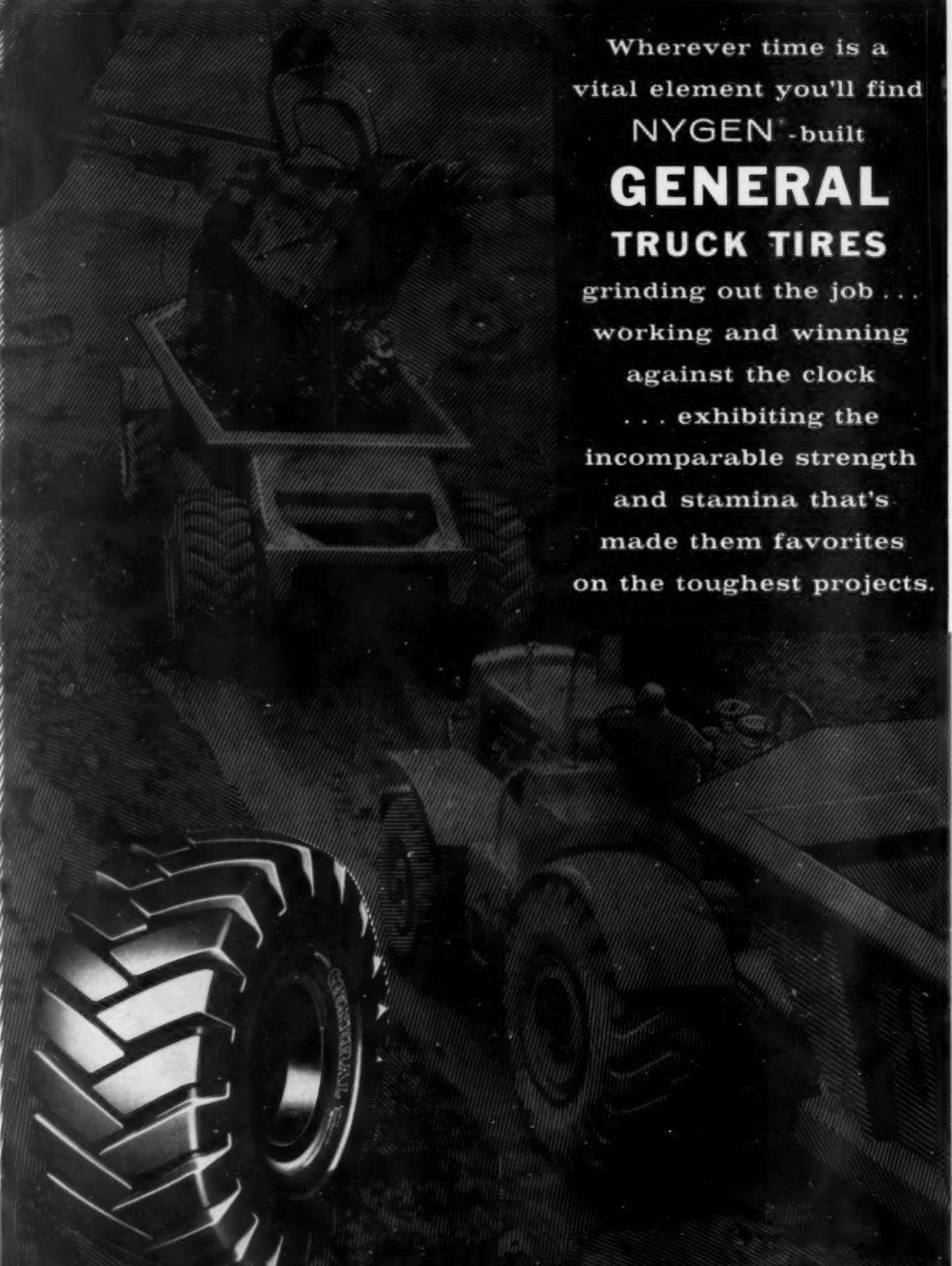


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it's Pacal.

T.M. Reg. U.S. Pat. Off.

ATTENTION, X-TRA-EDGE OWNERS—Pacal Plow Bolts are heat-treated for triple strength and hardness. They will not loosen or stretch and heads will not wear off. Especially developed to provide the longer wear required by your Pacal X-TRA-EDGE BLADES.





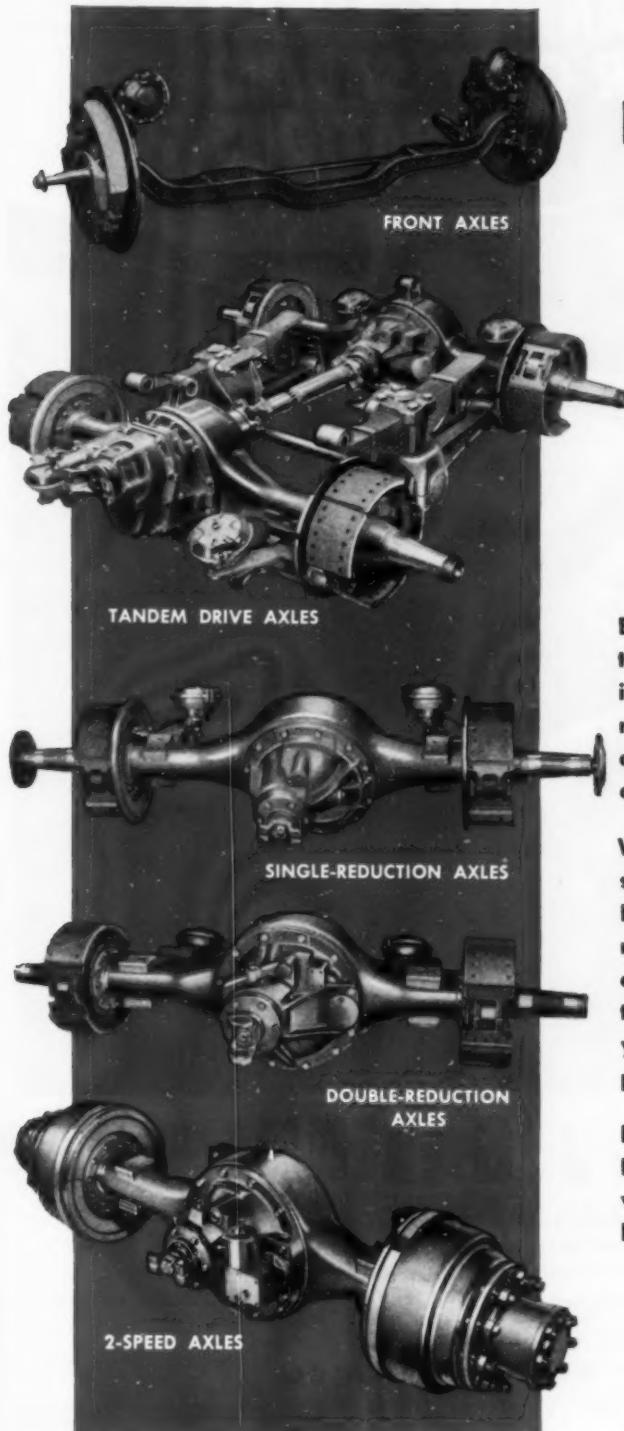
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vital element you'll find
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GENERAL
TRUCK TIRES
grinding out the job . . .
working and winning
against the clock
. . . exhibiting the
incomparable strength
and stamina that's
made them favorites
on the toughest projects.

Specify GENERALS on your new equipment
THE GENERAL TIRE & RUBBER COMPANY, AKRON, OHIO

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34

ROADS AND STREETS, April, 1959

For Top Performance and Lowest Cost Per Mile—



You Must Have the
RIGHT TRUCK
for the Job—
★
and the
RIGHT AXLE
on the Truck!

Pick the RIGHT AXLE
from Eaton's Full Line
of Types and Capacities

Every hauler knows how important it is to buy trucks that are RIGHT FOR THE JOB. Dollars invested for ample capacity and the right equipment to handle the job, are paid back many times over—in reduced maintenance, lower operating costs, and longer truck life.

When you buy a truck, it is important that you specify the RIGHT AXLE for the job. Your kind of hauling may call for single reduction, double reduction or 2-speed—and perhaps tandem drive axles. For you there is an Eaton Axle of the right type and in the right size—backed by almost 50 years of axle manufacturing experience, and by proven performance in more than 2-million trucks!

Discuss your hauling job with your truck dealer—he'll be glad to recommend the Eaton Axle that will give you more and longer service at the lowest cost per mile.



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MANUFACTURING COMPANY
CLEVELAND, OHIO

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GALION

For meeting the toughest primary compaction specifications . . . for tonnage of finish material rolled per day . . . and for doing their job in the **MOST ECONOMICAL** manner — Galion ROLL-O-MATIC Rollers are supreme.

Write for literature.

THE GALION IRON WORKS & MFG. CO.
General and Export Offices — Galion, Ohio, U.S.A.

GALION
ESTABLISHED 1907



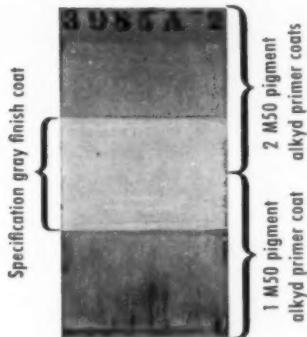
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Area shaded from sun by wooden panel holder

After 9 years exposure, fading has barely begun to show in this 3-mil M50 primer coat. Same type paint made with standard rust inhibiting pigment chalked and showed rusting in less than half this time.

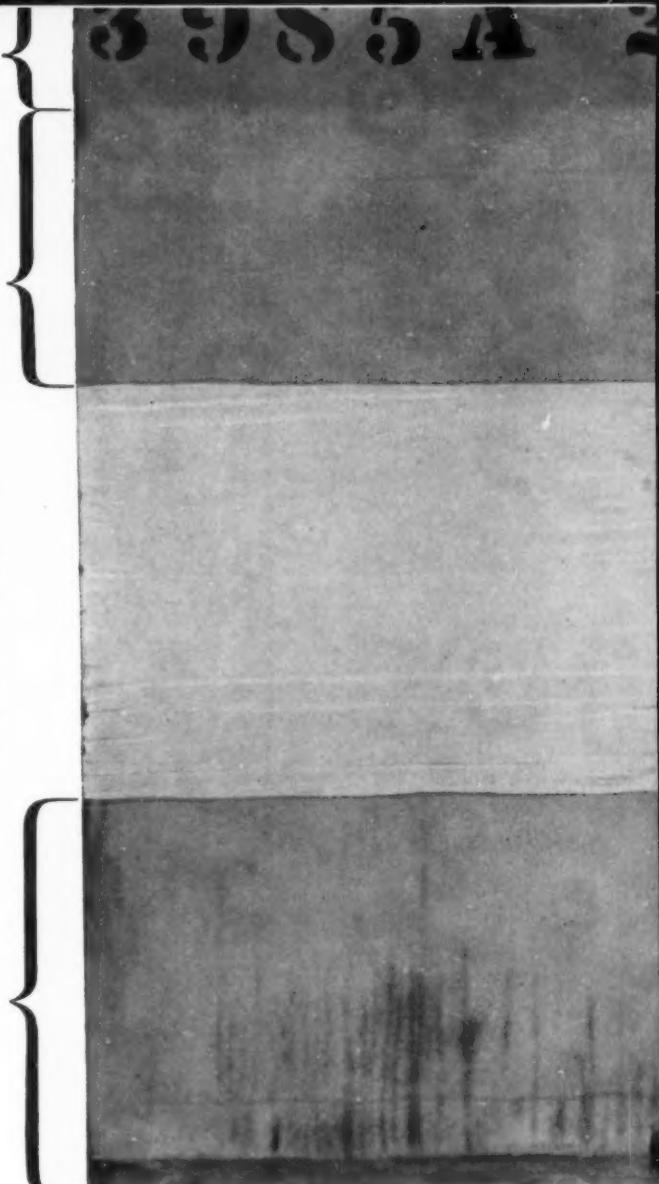
Unshaded area

How test paints shown at right were applied



Exposed 9 years 45°
Each coat 1.5 mils

1.5 mil M50 primer coat is still in place, still actively resisting corrosion after 9 years. Same type paint made with conventional pigment almost completely disappeared in the same period.



Proof M50 pigment Defense in Depth paints deliver lasting weather resistance

Never before such durable metal protection for highway bridges, guard posts, railings, sign posts. And never before such attractive color choices.



Here you see how typical M50 pigment primer coats weather 9 years exposure. The advantages of weather resistance like this in the primer coat of an anti-corrosive paint system cannot be overstressed. Long after weather has worked its way through intermediate and finish coats, primers made with *M50* basic lead silico chromate pigment* still provide excellent weather protection. Rust inhibiting action in the film continues unchecked. Even breaks in top coats trace-

able to damage or painting mishaps do little harm.

The excellent chalk resistance shown by M50 pigment primers also pays off handsomely. When steel erection is delayed, reparation of the steel is rarely needed. On-the-job spot priming is sharply reduced.

On the next page, see how typical M50 finish paints perform in severe exposure tests.

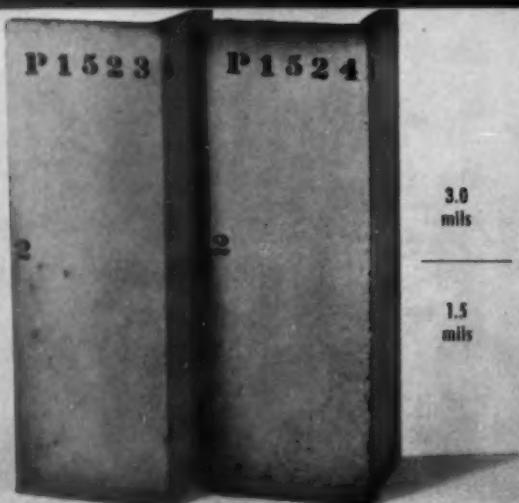


*Registered trademark of

National Lead Company

General Offices: 111 Broadway, New York 6, N.Y.

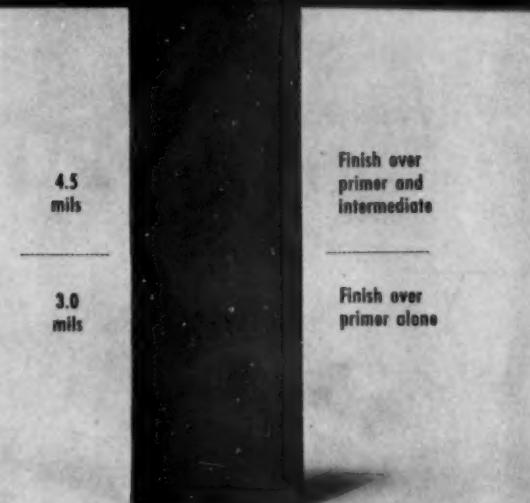




No visible splotching!

Test angles above show how a typical *M50* pigment finish paint applied directly to steel (no primer or intermediate) withstands 4 years exposure in indus-

trial atmospheres. Left, *M50* pigment finish applied on rusted surface with retained mill scale. Right, same paint applied on clean, sand-blasted surface.



No visible chalking!

45°S in normal atmosphere. The insolubility and stability of *M50* fused lead chromate pigment contributes substantially to this performance.

Here are two performance plusses you can expect from *M50* anti-corrosive finish paints exposed to weather

With *M50** pigment Defense in Depth paints, *lasting* weather resistance is obtained in *all* coats...not just intermediates and finishes. This is clearly brought out by exposure tests such as the ones shown on this and the preceding page.

Along with lasting 3-deep weather resistance, *M50* pigment anti-corrosive paint systems give you 3-deep rust inhibition and 3-deep color choice. Never before has it been possible to produce specification anti-corrosive paints with comparable performances that could be sold at current market levels.

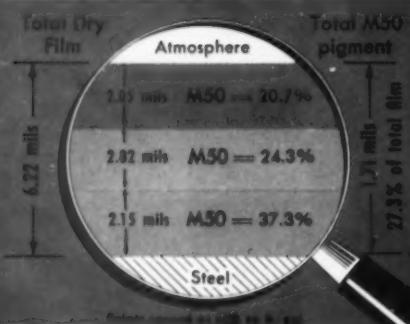
Now, with National Lead's *M50* pigment, most paint makers can make such paints.

National Lead is prepared to help your supplier formulate *M50* pigment paints and also: (1) show you *M50* pigment paint exposure test panels at its Sayville, L. I. Test Station; (2) send you a 24-page descriptive brochure, "Defense in Depth." (Mail coupon below); (3) provide technical aid in test applications; (4) help you develop suitable specifications for paints containing *M50* pigment.

For *M50* pigment paints themselves, contact your regular suppliers.

*National Lead Company trademark for a basic lead silico chromate pigment

Why *M50* Defense in Depth paints give you metal protection beyond all former concepts



In every coat...rust inhibition! Fused lead chromate is noted for rust-inhibition. The *M50* pigment particle structure permits paint makers to include large proportions of lead chromate in all coats of anti-corrosive systems.



**M50
Defense
in
Depth**

**National Lead Company,
111 Broadway, New York 6, N. Y.**

Gentlemen: Please send me your 24-page brochure, "Defense in Depth." Include color card of the six *M50* pigment paints you recommend for steel highway structures.



2 *M50* pigment alkyd primer coats
Exposed 9 yrs 45°S
Each coat 1.5 mils dry film

***M50* pigment finish
put on rusty steel**
Exposed 4 yrs 45°S
in industrial atmosphere



3.0 mils

Name your
own tint

Light Green

Dark Green

Orange

Buff

Maroon

Gray

In every coat...your choice of colors! *M50* pigment gets along well with most tinting pigments, permits paint makers a wide range of colors...not only in intermediates and finishes but in primer coats as well. Colors stay true.



Name _____ Title _____
Firm or Dept. _____
Address _____
City _____ State _____

Personals

ROBERT C. BRIGGS, recently district engineer in New England for the Asphalt Institute, is president of the newly incorporated Briggs Engineering & Testing Company Incorporated, Cohasset, Massachusetts.



Robert C. Briggs

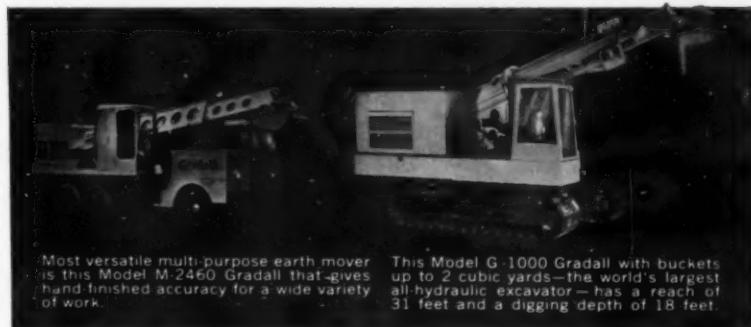
EDWARD W. DAYTON veteran of 38 years with the New York State Department of Public Works, has been made acting deputy chief engineer, succeeding Henry Penhagen, who has advanced to chief engineer.

WILLIAM C. BASSETT is appointed Superintendent of Operation and Maintenance, New York State Department of Public Works. He comes to this \$17,800 post with forty-five years of service in the department.

L. N. RESS, former State Highway Engineer of Nebraska, has joined the consulting engineering firm of Kirkham, Michael and Associates of Omaha, Oklahoma City, Fargo and Rapid City.

J. A. MECIA has been elected a general vice president of Utah Construction Company, of San Francisco. W. D. Leonard and L. M. Smith also are elected assistant secretaries, and F. W. Rollins, Jr., assistant treasurer.

NOW A COMPLETE LINE OF HYDRAULIC EXCAVATORS



Most versatile multi-purpose earth mover is this Model M-2460 Gradall that gives hand-finished accuracy for a wide variety of work.

This Model G-1000 Gradall with buckets up to 2 cubic yards—the world's largest all-hydraulic excavator—has a reach of 31 feet and a digging depth of 18 feet.

NEW GRADALLS...



Model 200 Hopto provides a $\frac{1}{2}$ yard bucket under complete hydraulic control, a 200 degree swing and a 14-foot digging depth. This is available on the truck-mount shown, also on wagon and crawler mounts.

Outperforming larger, mechanical-type equipment is easy for this Model 500-TM heavy-duty $\frac{1}{2}$ yard Hopto Backhoe. It provides a 20-foot digging depth and 360-degree swing.

NEW HOPTOS...

All Gradalls® and Hoptos® feature full hydraulic power with positive hydraulic control—to combine more movements with fewer controls than any other machines. This insures a more efficient working cycle to speed job completion.

Check with your Warner & Swasey Distributor and get the complete story on how these versatile earth movers can help increase your profit picture.

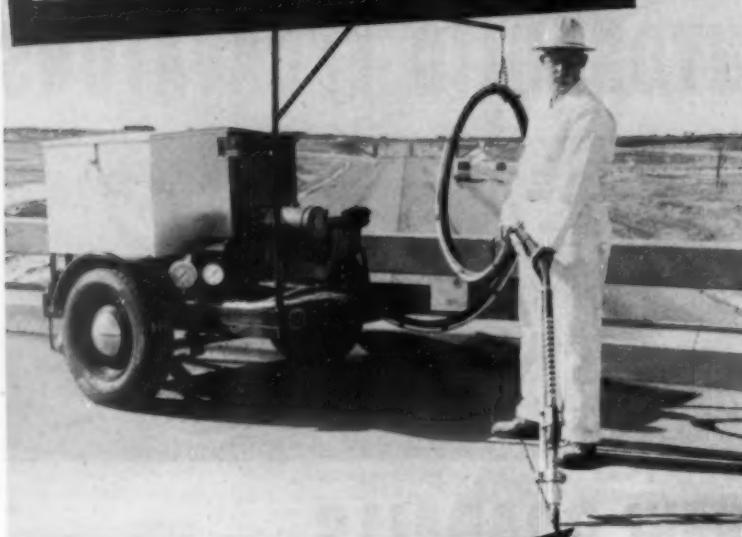
®Reg. U.S. Pat. Off.

WARNER & SWASEY
CONSTRUCTION EQUIPMENT DIVISION
Cleveland 3, Ohio



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BETTER SEALING



ALLIED *Jet Seal* **GIVES**
BEST PROTECTION AND APPLICATION

Allied JET SEAL Product 9015H was developed to answer the specific needs of highway engineers for a rugged, economical and easily applied joint sealant. JET SEAL has no flow—even at elevated temperatures. Ideal for inclined and vertical surfaces. It will prevent penetration of water into joints and is highly resistant to highway salts. Allied JET SEAL Product 9015H will also prevent incorporation of incompressible materials.

Adhesion, cohesion, resilience and ductility at low temperatures (-20°F) is assured with JET SEAL. The original special equipment exclusively developed by Allied to apply JET SEAL automatically proportions, mixes and places the material, which cures rapidly.

Write for additional information . . . Product 9015H.

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PRODUCERS, REFINERS
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Plants: Stroud, Okla. • Detroit, Mich. • Los Angeles, Calif.

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40

New Publications

CEMENT-SOIL STABILIZATION; Bulletin 198, Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price \$1.40.

Science attempts to improve upon existing methods, or to better explain the nature of materials and processes. It is seldom that a single group of papers devoted to one facet of engineering so clearly demonstrates the progress being brought about through a number of separate although closely related researches.

Papers in this bulletin present information on:

1. The effectiveness of flyash as an additive and as a replacement for cement in soil-cement;
2. An appraisal of the performance of soil-cement base courses on military airfields;
- 3 and 4. Short-cut methods for determining the cement requirements for sandy and clayey soils, respectively;
5. The effect of sulfates on the performance of soil-cement; and
6. A hypothesis that attempts to explain the differences in the nature of the cementing process in granular and in fine-grained (clayey) soils.

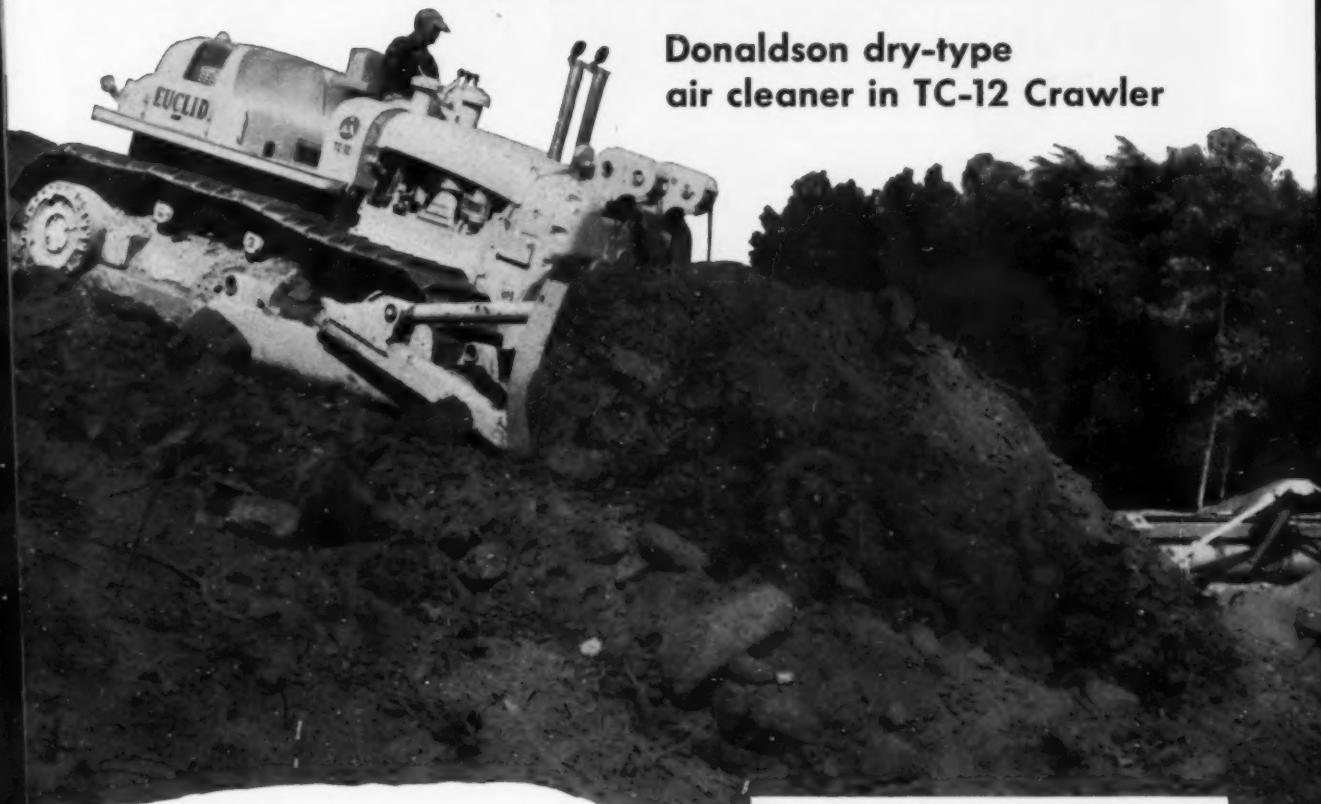
BASIC GEOLOGY FOR SCIENCE AND ENGINEERING. By E. C. Dapples, Professor of Geology, Northwestern University. John Wiley & Sons, Incorporated, 440 Fourth Avenue, New York 16, N. Y. 603 pages. Price: \$9.50.

This is a systematic analysis of processes considered basic to the subject. Designed for students planning to become geologists, mining, civil, sanitary or other engineers and scientists. Also a value to practicing engineers in these fields.

CATALOG OF HIGHWAY CONSTRUCTION TEACHING AIDS. Technical bulletin 237 (1959), American Road Builders' Association, World Center Building, Washington 6, D. C.

Published under ARBA's Division of Education, Professor L. H. Csanyi, Chairman, this pamphlet gives an alphabetical list of source material from various industries available for teaching, including engineering data, operating manuals, slides, movies and models.

Another EUCLID product improvement!



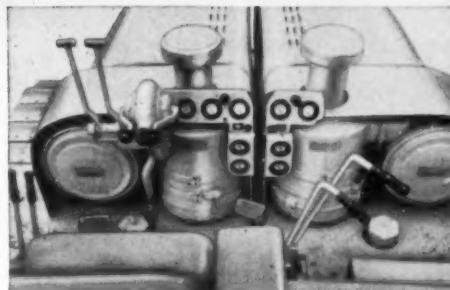
Donaldson dry-type
air cleaner in TC-12 Crawler

One of the reasons the new series Euclid TC-12 Crawler provides more work-ability with less down-time is the unequalled accessibility of all major components for quick, easy servicing.

As shown in the photograph, the two Donaldson dry-type air cleaners, one for each engine, are conveniently located for easy access. Both pre-cleaner and secondary filter can be serviced in a fraction of the time required for oil bath cleaners and there's no mess—just empty the pre-cleaner dust cup, clean and replace a paper element in the secondary cleaner.

HIGH EFFICIENCY CLEANER INCREASES ENGINE LIFE

The Euclid TC-12 Crawler is now being built with the Donaclone dry-type air cleaner as standard equipment. This 99.9% efficient cleaner reduces engine wear caused by dust—increases the service life of the engine and helps maintain top operating efficiency. Engine manufacturers say that 8 ounces of



abrasive dust can ruin an engine in a short time. Because of the tremendous volume of air that passes through an engine in a single shift, the importance of air cleaner efficiency is obvious. That's why Euclid uses this Donaldson cleaner on the new series TC-12 . . . it's another example of constant product improvement that makes Euclid your best investment.

EUCLID Division of General Motors, Cleveland 17, Ohio

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EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

fingers on...
the **PULSE** of PERFORMANCE



And it is positive performance made possible by the Patented
Hydraulic gooseneck jack and obtainable only on the

ROGERS Hydraulically Operated
THPG HYDRA-LIFT
DETACHABLE **TRAILER**
GOOSENECK

PULL THE LEVER. The gooseneck lowers for detachment or to travel with lowered deck to gain greater overhead clearance of high loads.

PUSH THE LEVER. The deck raises above normal position to obtain these advantages:

- (1) To gain clearance to pass over embankments.
- (2) Put blocking under overhanging loads—then lower the frame, detach the gooseneck and pull away.
- (3) To use blocking for a fulcrum and raise the rear of trailer for easy servicing of tires.

Operators tell us this is the fastest and most reliable detachable gooseneck trailer in the field.

Get the literature and the complete story.

ROGERS BROTHERS CORPORATION
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42

New Publications

New Blasting Handbook

Atlas Powder Company announces publication of a "Handbook of Electric Blasting" by David M. McFarland and Guy F. Rolland.

Mr. McFarland, Manager of the Atlas Explosives Division, Technical Customer Service Section since 1934, is widely known as "the father of millisecond delay blasting," and is author of the column "Mac's Notes," in the Atlas periodical, "Better Blasting."

Mr. Rolland was for more than 10 years Director of the Reynolds Experimental Laboratory, and is now Assistant to the Director of Research, Explosives Division.

The new 60-page handbook makes plain, for novice or experienced blaster, the whys and hows of effective electric blast detonation. Technical terms are explained in such a way as to give the beginner in electricity sufficient knowledge to enable him to use electric blasting successfully.

Among the subjects covered are: the advantages of electric blasting over old methods, the nature and construction of an electric blasting cap, and the sources of power for electric blasting. Tables and graphs are given for current delivered by standard blasting machines, resistance of copper wire and caps, and electric blasting circuits.

The book describes and illustrates methods of splicing wires, testing circuits, checking current leakage, and the use of rheostats. It is sturdily bound for hard use, and is small enough to fit in a pocket, so that it may be taken out on the job for quick reference.

Users of explosives may obtain this book free of charge from Dept. HR, Explosives Division, Atlas Powder Company, Wilmington 99, Delaware, or from their local Atlas representative.

MANUAL OF RECOMMENDED PRACTICE ON CONCRETE FINISHES. Highway bridge and structure designers are expected to find use for the simplified manual, published by the Concrete Industry Board, Inc., of New York City. Each of the important phases—form specifications through construction—are spelled



Pass after Pass—



—Yard after Yard



**Hour after Hour—Save with JOHN DEERE
840 DIESEL and Hancock "Piggyback" Scraper**

A most economical unit to operate. Heap-load its 7-1/2-yard bowl in a hurry—without a pusher. Make working turns in about a 22-foot radius. Drive it from job to job on most highways—with a special permit. That's the kind of performance that's earning this road-building unit a reputation as a real money-maker.

Ladder-type elevator driven by "live" constant-speed independent powershaft loads bowl from the top—pulverizes earth for speedy hydraulic ejection and uniform spreading.

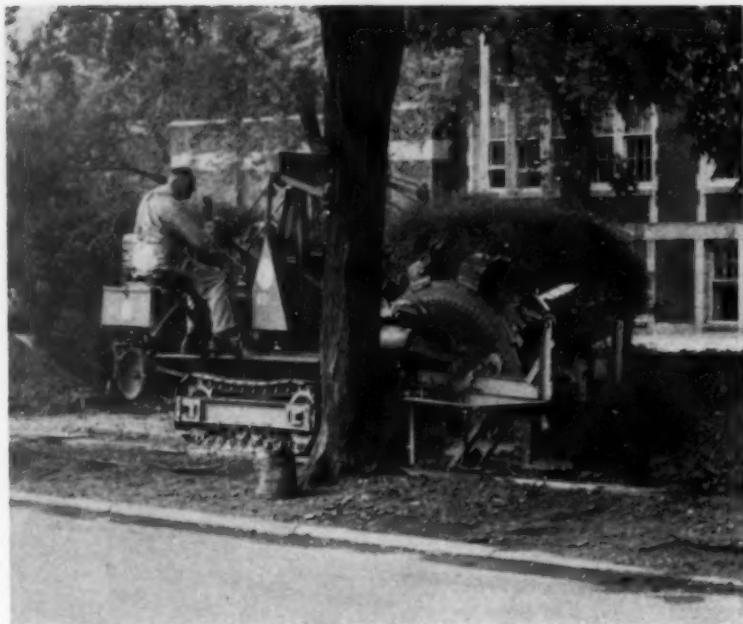
For firsthand facts and a demonstration—see your John Deere Industrial Dealer. For detailed literature, write Dept. 524.



JOHN DEERE INDUSTRIAL DIVISION • MOLINE, ILLINOIS

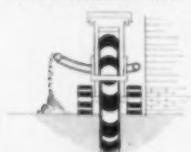
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ROADS AND STREETS, April, 1959

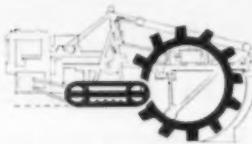


Nothing digs trench in the city like a Cleveland "Baby Digger"

PUTS TRENCH WITHIN
20 INCHES
OF A PARALLEL WALL



MORE THAN 30 USABLE
COMBINATIONS OF
CRAWLER AND
DIGGING WHEEL SPEEDS



GIVES YOU THE
RIGHT COMBINATION
OF POWER and SPEED
FOR EVERY SOIL
AND JOB CONDITION

If your jobs involve city and suburban trenching, a trim maneuverable Cleveland 92 is the trencher for you. This "Baby Digger" has the practical features and advantages that give you greater, more economical production in crowded areas...more trench...in more places...at less cost.

- Only 4' 6" wide over its crawlers.
- Shiftable, reversible conveyor.
- Digs easily past trees, poles, fences, etc.
- Digs 10" to 20" wide...down to full 5' deep.
- Full crawler mounting...completely maneuverable...perfect balance and stability...easy on lawns, sidewalks, etc.
- Finest crawler on any trencher...long-lived...non-packing...easy-rolling...friction-free...sealed bearings...200-hour lubrication.
- Easily portable...hustles from job to job at safe, legal-limit truck speeds.
- Used on thousands of miles of trenching for gas...water...sewer...telephone...electric power...building footings...airport, highway construction.

fast • accurate • clean • dependable
nothing digs trench like a Cleveland

The CLEVELAND TRENCHER Co.

20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

Good



Everywhere

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New Publications

out in detail for the architect, engineer and contractor.

The 5 x 7 in. pocket size manual, priced at \$1.00 may be obtained by writing to The Concrete Industry Board, Inc., Room 2503, 220 East 42nd St., New York 17, N. Y.

BUREAU OF PUBLIC ROADS, ANNUAL REPORT (1958), 94-page review of fiscal year's activities of the bureau. Available from Superintendent of Documents U. S. Government Printing Office, Washington 25, D. C. Price 30¢.

IMPROVING THE WATER REPELLENCY OF HARDENED CONCRETE; Bulletin 197, Highway Research Board, 2101 Constitution Ave., Washington, D. C. Two papers presented at the Board's 37th annual meeting on use of silicones. Price \$0.50.

AIR-VOIDS IN CONCRETE AND CHARACTERISTICS OF AGGREGATES; Bulletin 196, Highway Research Board 2101 Constitution Ave., Washington, D. C. Contains three papers presented at the 37th annual meeting of the Board. Price \$1.00.

QUARTERLY TOLL REVIEW, American Bridge, Tunnel & Turnpike Association, Inc. (Winter 1958-59 issue). Published by the Association, P. O. Box 748, White Plains, New York.

Good Roads Scholarships for Canadian Students

Six scholarships for post graduate studies in highway engineering or transportation are being awarded by the Canadian Good Roads Association for 1959. These scholarships have a total value of \$13,000. The scholarships are open to all Canadian graduate engineers and are applicable at universities in both Canada and the U. S. Application forms obtainable from the association, 270 MacLaren St., Ottawa 4, Canada.



SURFACE BREAKUP

**...is cut to a minimum when you treat
gravel roads with Sterling Rock Salt!**

Every spring brings new evidence that salt-treated roads are relatively unaffected by potholing, frost heaving and aggregate loss. In most cases, only infrequent blading is needed to keep these roads in good shape from year to year! This greatly reduced maintenance, coupled with the original low cost of Sterling Rock Salt treatment, permits highway departments to devote a larger share of their budgets to other important road-construction work.

Special equipment is no longer needed for effective salt treatment of gravel roads. Last year, Inter-

national Salt Company introduced a simple, practical 7-step method which is fully described in a free booklet, "Better Roads." Send today for your free copy, and learn how Sterling Rock Salt treatment can work in your area.

International Salt Company, Inc.
Department RS-4
Scranton 2, Pennsylvania

Please send free booklet, *Better Roads*.
 Have a Sterling representative call.

Name _____

Address _____

City _____ State _____

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**Service and research are the extras in
STERLING ROCK SALT
INTERNATIONAL SALT COMPANY, INC.**

How one 2½-yd. shovel moves 2,000 yards of hard sandstone, clay and shale a day on Ohio road job

5th Manitowoc for Hatcher Bros. Pays Off on Road Building



This Manitowoc Model 3000 shovel equipped with a 2½-yd. bucket has been averaging 2,000 yards of sandstone, shale and clay per 10 hour day working on the rebuilding of Route 39 near Salineville, Ohio. Hatcher Bros. Inc. of Mingo Junction, Ohio is handling all the excavating and grading on the \$417,000 job which calls for the regrading and removal of 117,000 yards of material, containing approximately 33% rock. In addition to the Model 3000, the company also owns two Manitowoc 1½-yd. Model 2000 rigs and two 40-ton Model 2800 Mobile Cranes.

300,000 Yards of Rock — Prior to the present operation, the 2½-yd. shovel loaded out 300,000 yards of rock on another Ohio road job. The machine was moved to the present location in only three loads. "On both jobs," says Mr. Jim Smith, Superintendent, "the shovel has given us smooth, uninterrupted performance, with no appreciable downtime. We have never hit a rock formation that the machine could not break up and carry . . . nor have we been halted by a machine failure."

How You Can Benefit — Fleet owners like Hatcher Bros. know they can depend on their Manitowoc rigs for consistent, high output performance on any job. Judge for yourself . . . see your distributor soon for full details on any of the eight bonus-capacity Manitowocs.



Manitowoc shovel cuts a 1' x 1' slope through stratified hard sandstone. Thirty per cent of the excavated rock is used as fill.

Manitowoc

MANITOWOC ENGINEERING CORP.

(A subsidiary of The Manitowoc Company, Inc.)

MANITOWOC, WISCONSIN

CRANES

20 TON - 100 TON

SHOVELS

1-YD. - 5½-YD.

DRAGLINES

1-YD. - 6-YD.

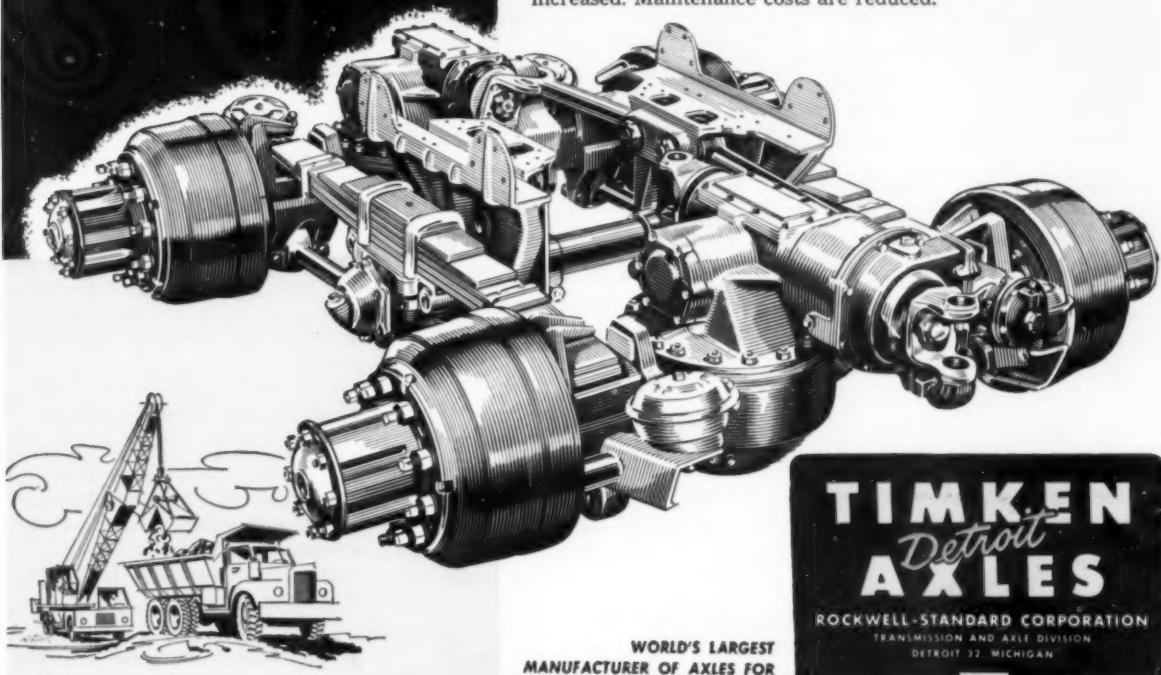
TRENCH HOES

1-YD. - 2½-YD.

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PROVED
AND
PREFERRED...

Timken-Detroit Axles are the Accepted Standard!



Products of

ROCKWELL-STANDARD

Corporation

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ROADS AND STREETS, April, 1959

Timken-Detroit Heavy-Duty Tandems Are First Choice With Big Off-Highway Operators!

These superior features make the difference:

"Cradle Ride" Suspension. Free ends of long, resilient springs float in axle spring guide brackets. This permits axles to articulate freely, compensating for road irregularities. Floating springs cradle the vehicle, materially reducing road shock and eliminating source of vehicle flutter. *The load is more stable . . . driving is easier, more restful, safer.*

Hypoid Gears. Larger pinions and greater tooth contact give 30% more torque capacity, top efficiency and long life . . . plus lower maintenance costs.

Driver Controlled Inter-Axle Differential. Torque is divided equally between axles, yet wheels of one axle can turn faster or slower than wheels of other axle. This means both axles are always doing equal amounts of work. *Driving parts and tires last longer.*

Hot Forged Rectangular-Shaped Axle Housings. Rectangular shape, combined with full strength corner sections, provides the greatest strength with minimum weight and size. Welded-on bowl cover prevents leakage.

Torsion Flow Axle Shafts. More splines, plus greater root and body diameter, add extra strength.

Straight-Line Through Drive. Straight through drive eliminates all prop shaft angularity. Bearing and gear life is materially increased. Maintenance costs are reduced.

TIMKEN
Detroit
AXLES

ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN

Accepted  *Standard*
TRADE MARK
REGISTERED

SERVICISED

ZERO-LASTIC® JF

JOINT SEALER for the JET AGE



**Impervious
to Jet Fuels...**

**keeps Joints Sealed
UNDER ALL CONDITIONS**

Servicised Zero-Lastic JF Sealing Compound is a cold-applied, jet fuel resistant, rubberized tar compound specifically designed for sealing expansion, contraction, or dummy joints in concrete paving of airfields and airports. Zero-Lastic JF is easily applied to joints from $\frac{1}{4}$ " up to 1" or more wide by any of several types of mixer-extruder units. Once installed, it cures internally into a resilient, rubber-like seal which has excellent bond with both sides of the joint. Since Zero-Lastic JF contains no thinner, there is no shrinkage after placing in the joint.

Because Zero-Lastic JF is unaffected by jet fuel or other petroleum solvents used by aircraft, joints sealed with the material stay sealed under the most adverse aircraft re-fueling and maintenance conditions. Zero-Lastic JF can be used with equal efficiency on new or old pavement joints.

Write for complete details on Zero-Lastic JF and
other Servicised Joint Sealing Compounds.



SERVICISED PRODUCTS

CORPORATION

6051 WEST 65th STREET • CHICAGO 38, ILLINOIS

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**Grid Roller Does It
on Tennessee Project
(Cover Scene)**

The cover scene this month shows two familiar kinds of action on a grading project in Tennessee. The project was the relocation of US 27 in the northeastern part of the state, graded in 1958 by McDowell & McDowell, contractors. Over a million cubic yards of road way excavation was required on this project which had a great variety of soil and rock materials.

This firm according to Robert A. McDowell, president, finds the Hyster Grid Roller pictured a particularly good compaction tool where sandstone and shale materials are encountered. The material was blasted and moved by dozer and scraper. The grid roller functioned to break up the material so that it would make a well compacted fill. Roller types in Tennessee are left to the contractor.

The inspector and laboratory field man from the Tennessee state department of highways are seen taking routine density samples from the compacted grade using the sand cone method. The 95 percent density requirement (standard AASHO) was no problem with the good materials encountered.

The concern over soil conditions by the state engineers on Tennessee Interstate and Primary road projects begins with a thorough preliminary investigation. All cuts along a proposed location are drilled that can possibly be drilled with mobile auger-type units mounted on Dodge Power Wagons. The samples are run through the lab and the information obtained is plotted on cross-section and used for design purposes.

● The number of vehicle-miles traveled on main rural roads in December, 1958, was 19,181 million, the Bureau of Public Roads reports. This compared with 18,645 million miles in December, 1957—an increase of 2.9 percent.

● The New York State Thruway Authority reports income of \$34,908,051 for 1958—12.37 percent over the previous 12 months. Toll collections comprised \$30,961,595, of which \$8,826,390 was from commercial patrons.



JOB RECORDS PROVE

Firestones deliver more hours of service!

Firestone Off-The-Highway Tires are cutting hourly costs on the roughest jobs in the business! That's because every Firestone Tire is built with Firestone Rubber-X, the longest wearing rubber ever used in Firestone tires! Tough Firestone treads and sidewalls defy cuts in rubble and shale. Exclusive Firestone S/F (Shock-Fortified) nylon bodies resist damage from bruising shock and impacts. And job-engineered tread designs always give the traction you need under any operating condition. Call your Firestone Dealer or Store and ask him about Firestone's full line of tubeless and tubed off-the-highway tires and on-the-job tire service.



Rock Grip Excavator®
Wide Base

Rock Grip Excavator®
Firestone T.M.

When ordering new equipment always specify Firestone tires—available tubeless or tubed

Firestone
BETTER RUBBER FROM START TO FINISH

ROADS AND STREETS, April, 1959

Enjoy the Voice of Firestone on ABC television every Monday evening.
Copyright 1959, The Firestone Tire & Rubber Company

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Heavy Construction Operators

Go FORDWARD for greater payload... power..

"Our Ford trucks haul up to a ton-and-a-half more payload per trip"

says William R. Collins, V.P.

William Collins and Sons, Fargo, N.D.

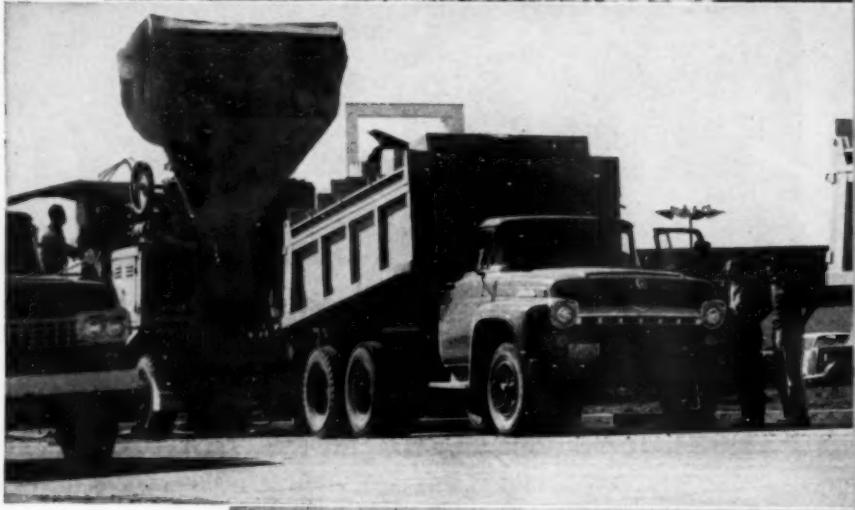
"We switched to Ford trucks in 1951 because we found we could haul 1½ tons more per trip. Now we have 124 Fords, including 80 T-700's. They're economical to operate, too—we get up to 6 miles per gallon. Our drivers like Ford's power steering and peppy 302 HD V-8 engine. We like Fords because we know we can always get Ford parts quickly if we need them. That means our trucks aren't down over one day, even on a major overhaul."



"We trade every two years and find that Ford trucks bring highest resale price"

*says John McCormick, Sec.-Treas.
Northern Improvement Co., Fargo, N.D.*

"We keep our Ford T-700's in top condition year round, and it pays off. We get a higher resale price when we trade every two years. Fords have the ability to perform under the rugged conditions in our work. Power steering on our tandem dumps makes them easy to handle on-or off-the road.



"Our drivers like Ford's power... they get heavy loads under way fast"

*says George C. Wilson, General Superintendent
Schultz and Lindsay Construction Co., Fargo, N.D.*

"Ford's HD power in our T-750's gets heavy loads under way fast... helps keep us on schedule. And we can haul bigger payloads doing it... up to a yard more, legally, every trip. We've never had frame trouble either. They're rugged, durable trucks and if we ever need Ford parts, we can always get them at the nearest town."



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Detroit 31, Michigan

**'59 Ford Pickups Win
Economy Showdown U.S.A.
—average 25.2% better
gas mileage!**

Impartial tests of the 1959 pickup models of all six makes prove conclusively that Ford's $\frac{1}{2}$ -ton pickups equipped with Short Stroke Sixes are the economy champs for '59.

HOW TESTS WERE MADE

Standard six-cylinder models of the six leading half-ton pickups first were put through exhaustive road trials. All '59 trucks—Ford and competitive—were bought from dealers, just as you would buy them. After at least 600 miles break-in, all were brought up to manufacturer's recommended specifications.

The trucks were then tested—by America's leading independent automotive testing firm—at constant speeds of 30, 45 and 60 miles an hour. Next came stop-and-go tests, ranging from moderate city traffic to normal retail delivery operation. Acceleration rates were carefully timed in each gear to insure accurate results for all makes.

HOW NEW '59 SIXES RATE IN GAS MILEAGE

'59 FORD SIXES GIVE	25.2%	31.1%	9.6%	42.6%	22.0%	25.2%
more miles per gallon than Make "C"	more miles per gallon than Make "I"	more miles per gallon than Make "G"	more miles per gallon than Make "D"	more miles per gallon than Make "S"	more miles per gallon than Make "S"	more miles per gallon than the average of all makes

The '59 Ford Sixes, in every test, averaged more miles per gallon than every other make! Combining all tests, the '59 Fords led the average of all other '59 pickups by 25.2%.

WHAT'S THE SECRET?

How can a '59 Ford Six make four gallons do the work of five in other trucks?

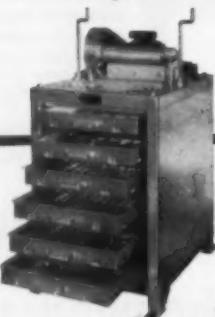
First, of all pickup Sixes, only Ford has modern Short Stroke design. This new type of engine is basically far more efficient than long-stroke Sixes of other pickups. Example: Ford's Six delivers more usable horsepower than any other pickup Six.

Second, to this modern engine Ford has added a new economy carburetor. By metering fuel more precisely in both low- and high-speed ranges, Ford's new carburetor boosts gasoline mileage in every type of driving. And Ford's *Economy Carburetor is standard at no extra cost*.

Your Ford Dealer now has the complete report of Economy Showdown U.S.A. Why not call or visit him today and get the whole story firsthand?

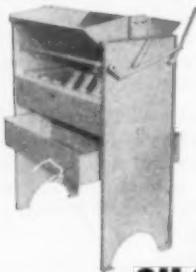
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Highway Lighting

Low Level Fluorescent Meets New Jersey Test

Preliminary tests have shown low-level fluorescent lighting installations to be dramatically effective, according to the New Jersey state highway department. A recent installation on the Route 72 Manahawkin Causeway Bridge, Commissioner Dwight R. G. Palmer said, is the first of its kind.

Engineers confirmed that tests conducted at the bridge site have served "to unreservedly confirm" the installation's plans which were completed more than two years ago and which reflected experiments of this specific design in 1954.

lute uniformity of illumination along the roadway.

2. This uniformity of illumination makes it possible to use a relatively low level of brightness, which eliminates glare.

3. All illumination is accomplished by reflected light rather than direct light from the lamp. This is also a factor in eliminating glare.

4. All light is confined to the roadway only, leaving the parapet in shadow. This tends to keep the driver's attention on the roadway.

5. Roadway limits are very clearly defined, particularly the side of the center barrier, which runs the length of the bridge.

6. Because the light is delivered to the roadway in an almost horizontal direction from a low level source, it will be more effective in fog, rain or snow.

7. The lighting units can be re-



• How the New Jersey bridge deck installation appears at night.

The novel installation consists of 384 separate fluorescent lighting units mounted in the top railing of the 2,400-ft. long bridge balustrade. Each 42-in. long unit is spaced approximately 2 ft. from the next, and the lights' rays are directed to the bridge's four lane wide concrete roadway at right angles to traffic.

Tests of the lighting were made within the past two weeks, under actual field conditions with all units lighted. Temporary main trunk electrical connections were made to permit the tests to be carried out. The permanent lighting cycle will be readied to begin operation when the main roadways of the causeway are completed early in the 1959 spring.

The department said its tests of the lighting indicated clearly the following:

1. The lighting produces abso-

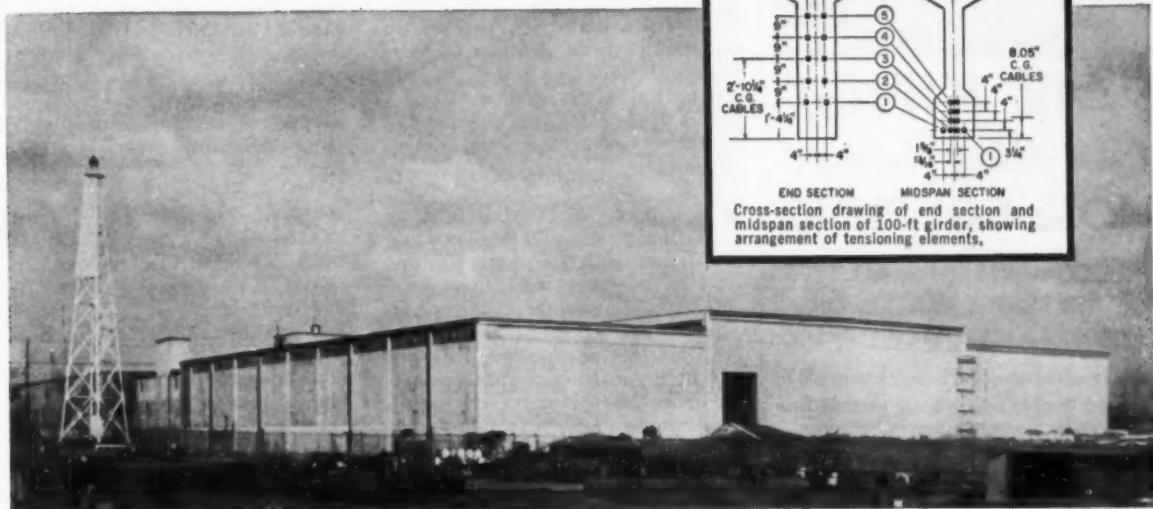
luted and serviced from the 3 ft. sidewalk immediately below the rail and at the outer edge of the traffic lanes. The availability for servicing will prevent any obstruction to roadway traffic and also provide safety for the repairmen, as well as for the motorists.

8. During daylight hours, the lighting units blend with the rail giving little evidence of their presence, contrasting in this respect with poles and overhead luminaires.

9. The electrical connections are such that with the failure of any circuit, the luminaires remaining in service will still produce a uniform symmetrical pattern of illumination.

10. Because all light produced by the luminaires is delivered on the roadway surface, this represents the most efficient use of the candle-power of the light source.

Architect-Engineer offers some impressive reasons why his firm chose Prestressed Concrete for Paper Storage Warehouse



Newman & Company Warehouse, embodying twelve 100-ft post-tensioned girders, twenty-two 70-ft post-tensioned girders and about 600 pre-tensioned double tee beams.

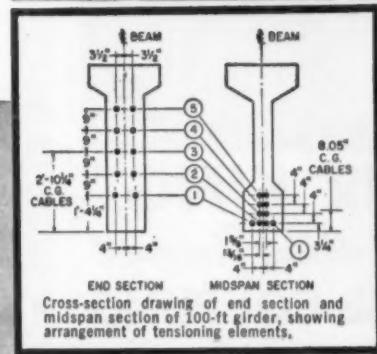
*Architects and Engineers: Cronheim & Weger, Philadelphia, Pa. Contractor: Lauter Construction Company, Philadelphia, Pa.
Prestressed Fabricators: Atlantic Prestressed Concrete Co., Trenton, New Jersey.*

Because Nathan Cronheim, architect-engineer, has much to say about this structure, we quote him as follows: "The design of the new waste paper storage building for Newman & Company, Inc., manufacturers of paper board in Philadelphia, incorporates a number of relatively new techniques and processes in developing a more fire-resistant building and in expediting the handling of stored materials.

"The roof structure is composed of twelve 100-ft span and twenty-two 70-ft span post-tensioned girders. Each girder was post-tensioned with ten Freyssinet Cables composed of twelve .276" diameter Roebling wires. (See diagram). The approximately 600 double T's used in the roof structure are pre-tensioned, using the Roebling standard seven wire pre-tensioning strand. The great strengths resulting from this method allow the roof structure to be much shallower and lighter in weight than would be possible in other types of equally fire-resistant construction.

"The building is two hundred and forty-ft wide, made up of a center bay one hundred-ft wide and two side bays each seventy-ft wide. There are, therefore, girders one hundred-ft long in the center bay flanked on either side with girders seventy-ft long. Since the girders are spaced twenty-five ft on centers, the T's which span from girder to girder are almost twenty-five ft in length. As can be readily seen, due

Photo shows how 100-ft girder rests on column. End of 70-ft girder is positioned on seat seen at top of ladder, left.



Cross-section drawing of end section and midspan section of 100-ft girder, showing arrangement of tensioning elements.

to the exceptionally long spans, it is necessary to use the higher strength materials mentioned to keep the dead weight of the roof structure to a minimum.

"Because of the prefabrication of so many of the elements of this building, such as the girders, roof plank, wall panels and many of the columns, the erection of the building moved very rapidly once the foundation work was completed."

Nothing makes a better case for the prestressed concrete method than the *architect's own words*. In all of the many years that Roebling has concerned itself with tensioning elements for prestressed concrete, we have found that its inherent benefits are best articulated by the architects and engineers who design for, and work with, prestressed concrete. During these years we have developed and accumulated a significant body of knowledge, data and experience that we will gladly share with you. An inquiry to Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, bearing on any phase of prestressed concrete, will bring a prompt and fully documented reply.

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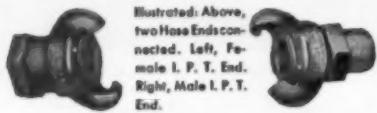
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nected. Left, Fe-
male I. P. T. End.
Right, Male I. P. T.
End.

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HOW 1959 LOOKS TO THESE CONTRACTORS

(As reported at Miami AGC Convention)

SUPPLEMENTING the exclusive Roads and Streets roundup on the highway contracting outlook, published last month, the following appraisals were made in a report of the CIMA-AGC Joint Cooperative Committee when met at Miami.

• **Southwest:** W. D. Amis, of Amis Construction Co., Oklahoma City, Oklahoma. The Southwest contractors, as a group, feel that there should be less tension in the bidding during 1959, but at the present time they are looking for work and their construction machinery is far from being totally employed. This situation will probably continue until July or August of this year.

The contractor who is only interested in moving earth is having a more difficult time than the contractors who perform all phases of highway construction. The jobs of the Interstate Highway System do not in many cases involve great yardages of earth and the prices being bid by contractors on the movement of this earth is very low and at the moment does not warrant the replacement of equipment even though this would result in a reduction of operating costs. A very large volume is necessary to justify upgrading existing equipment when it is not worn out but just less efficient than the 1959 vintage.

The contractors backlog of work was greatly reduced during the last quarter of 1958 through the completion of many jobs made possible by the exceptional fall weather. Had this not been true, many of the contractors fleets would still be tied up on jobs to be finished in the spring with the resultant upturn in unit prices and the requirement for additional units to start any new jobs.

Mr. Amis felt that by mid-sum-

mer, the contractors equipment should be fairly well employed, opening the way for additions and replacements to existing fleets to keep these fleets up to date and to permit cost reductions through the more efficient operation of this new equipment.

• **North Central:** Irving F. Jensen, of Jensen & Krage, Sioux City, Iowa. The unit prices being bid in the Midwest do not permit extensive replacement of existing equipment or the addition of much new equipment even though the new equipment would operate more efficiently than some of those now in the contractors fleet. It is a matter of the advisability of increased capital investment without being able to foresee a profitable return. It may well be that by mid-summer, when the construction activity has increased, and the available volume will be much higher than it is now, that the unit price structure may be influenced sufficiently to justify the replacement or additions to the contractors equipment fleet.

• **Pacific Northwest:** A. S. MacDonald, of Strong & MacDonald, Inc., Tacoma, Washington. The construction activity in the Northwest is at the moment far below the capacity of the available contractors to handle. Present tabulations of bids are averaging 12 percent below the highway department estimates and a desirable job may attract anywhere from 20 to 30 bidders.

Everyone in the area is looking forward to a stiffening of unit prices that in all probability will come about when a larger volume of work is available. It remains to be seen, whether the spring and summer lettings will correct a situation where the consistent lowering of unit prices are in many cases below the contractors cost. This is, of course,

unwise but is being done to keep working in an effort to meet fixed organizational charges and equipment payment. Unless a large volume of work is made available in this area, this unhealthy situation may continue during 1959.

● **Consensus:** It was the consensus of the contractors present that the unit prices obtained by the contractors will greatly influence their desire or financial ability to purchase either replacement units or new units for their fleet. Unit prices are more realistic on structures and surfaces than on earthmoving.

The lower unit prices have been caused by several factors. Many contractors increased their fleets at an early date in anticipation of a construction volume which is only now showing up. In some cases, new capital and new individuals have entered the construction field, attracted by the tremendous publicity given the Federal Highway Program. However, these newcomers into the construction industry are not always the principal offenders.

In many cases, the blame for lower unit prices rests on the shoulders of contractors who have been in the business for many, many years.

A report released by the Bureau of Public Roads since the AGC Miami meeting, shows a national aver-

age of 6.8 bids per Federal-aid highway project, with the low bids averaging 10.1 percent below the engineer's estimate. A few jobs have been awarded as much as 29 percent lower than the estimate.

It was estimated as of early February in the Middlewest, that 10 percent of the contractors have 80 percent of their capacity already under contract and 90 percent only 10 percent of their capacity under contract for 1959.

In the East, the situation was somewhat better. It was estimated that 30 percent of the contractors had 80 percent of their capacity under contract for 1959, 40 percent of the contractors had 50 percent and 30 percent only 10 percent of their capacity under contract.

Increase volume as the spring opens up, should make the contractors more selective with the resultant stiffening of unit prices. As a group, the contractors are much more optimistic now than they were this time last year and their equipment situation is about the same as it was at the time this Committee met on February 9, 1958, except that July of 1959 will probably equal Labor Day of 1958, as the estimated time when construction equipment inventory now in the contractors' hands, would be fully employed.

Contractors Must Expect Obsolescence of Their Equipment

"Much equipment will in the future, become obsolete through dramatic and drastic changes in design as the manufacturers endeavor to reduce the contractors' costs by making increased production possible."

So said Julian R. Steelman, president, Koehring, speaking as a member of the CIMA-AGC Joint Cooperative Committee which met at Miami. "This trend," he continued, "always causes great concern to the manufacturer because of the expense to the user. For guidance in this, an effort was made to determine the contractor's reaction to the increased production and lower costs versus obsolescence of equipment and increased capital investments. The results of a survey indicated that only a small percentage of the contractors interviewed felt that drastic changes in design would result in a hardship for them.

There was also a small percentage of the contractors who had no concern one way or another. The majority of the contractors, felt that progress could not be retarded and that the resultant lower unit cost made possible by the newly designed, and more efficient equipment would more than make up for the added additional capital expenditures.

"It may well be that in the future, as has been the pattern in the past, radically designed new equipment carrying as much as a 12 percent increase in price, might result in a 50 percent increase in productivity."

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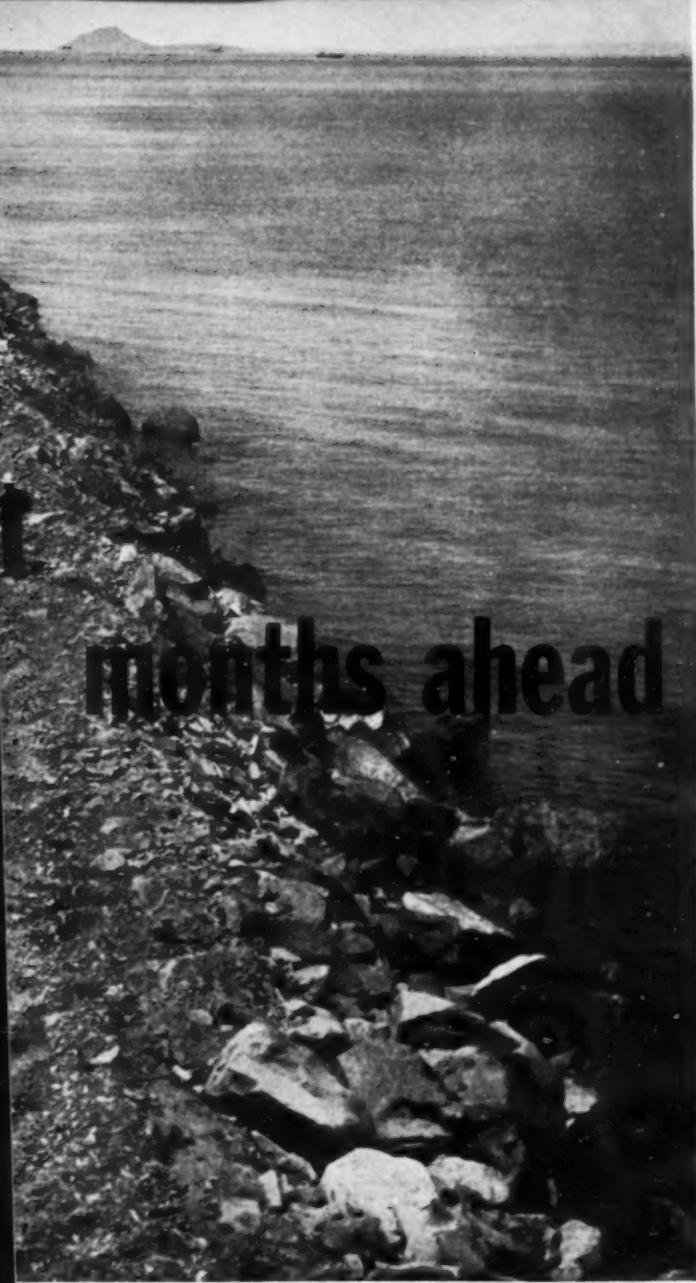
Travel a total of 20,000 miles a day!

Construction of the 12.6 mile causeway across Great Salt Lake in Utah for the Southern Pacific Railroad is one of the most unusual projects in earthmoving history. An estimated total of 36 million yds. of rock, sand and gravel is being placed in a foundation trench dug into the lake bottom to provide stability for the fill. Morrison-Knudsen Co., Inc. is using barges, trucks and rail cars on a 'round the clock, seven days a week schedule and has placed as much as 2,400,000 yds. on the fill in a single month.

There are 46 Rear-Dump "Eucs" of 22-ton rated

payload capacity and 18 big Bottom-Dumps. This fleet rolls up a combined total of 20,000 miles a day—some round trip hauls are 23 miles in length.

As of the end of August, 1958, the "Eucs" had recorded a total of 295,618 operating hours. The 25 yd. Bottom-Dumps hauled over 38 million tons of gravel — nearly 10½ million yds. of rock and gravel were moved by the Rear-Dumps. It takes dependable, rugged equipment to maintain high production day after day — that's why leading contractors like M-K count on Euclid equipment for low costs and the best return on their investment.



months ahead of schedule

Loaded by 8 yd. shovels, the Bottom-Dump fleet hauls 30 yd. loads to drive-over hoppers at the start of a two mile conveyor system that loads the big barges.



months ahead of schedule



Finished causeway will project 17 feet above the lake surface—"Eucs" top out the fill after barges have raised it above water.

See your Euclid dealer for information and performance data on the complete line of "Euc" Scrapers, Rear-Dump and Bottom-Dump Haulers and the world's most powerful crawler tractor—there's a size and type to match your needs.

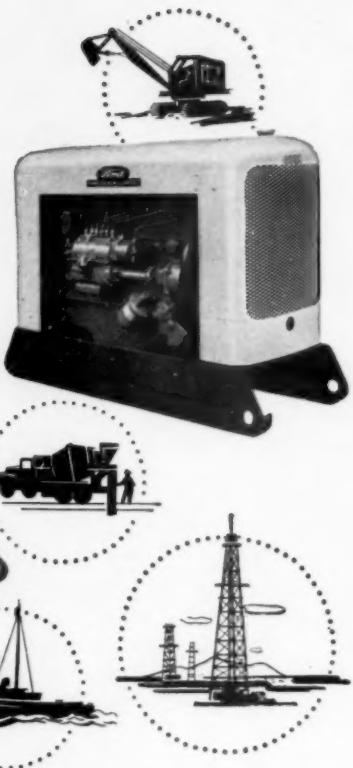
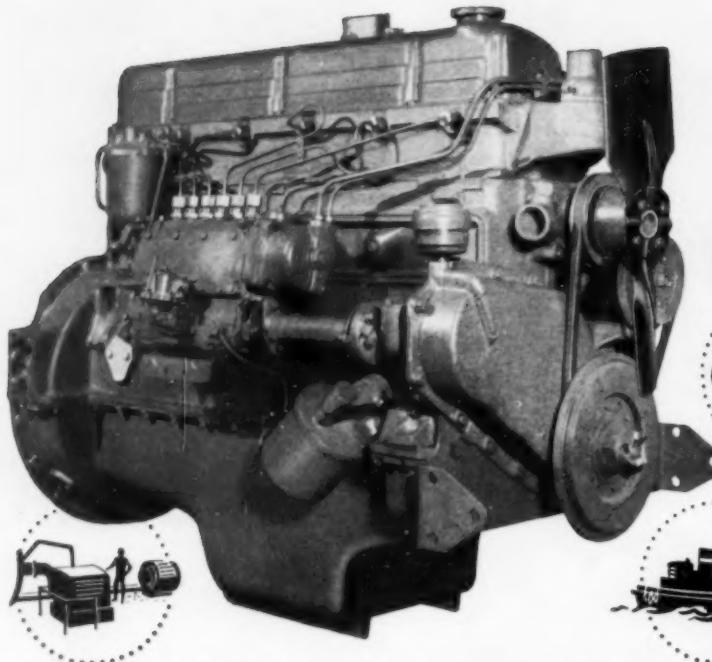


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	Continuous	48 @ 2250	77 @ 2250
Torque	Dynamometer	151# @ 1600	236# @ 1600
	Continuous	121# @ 1600	189# @ 1600
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ROADS AND STREETS

Nimble Mechanical Service Helped

Offset Wet Weather

Ohio contractor backed up his grading fleet with well planned mechanical field service and fuel supply. All-wheel-drive helped rigs keep going in slippery clay during very rainy summer.

Behind the lines" facilities were planned as carefully on the job here pictured as the earthmoving methods themselves. The project was a 6-mile segment of Ohio's Interstate U.S. 35 freeway, located in rolling country near Mansfield. There was three million cubic yards to move, including a 1,100,000 cu. yd. rock cut at one end (described in Roads and Streets, March, 1959).

The contractor, C. F. Reogle, of Circleville, Ohio, sized up the job from long experience as one that would entail some rough conditions, particularly in the early stage. Rocky, steep trails at first, slippery clay most any time. These conditions, plus a policy of maintaining a sensible but thoroughly equipped and manned "support" organization, are reflected in the following notes on the "I" job. The notes and photos are from mid-1958 when the grading was in full swing.

1. Reogle's mechanical and service staff, headed by Tracey under project manager Lawrence Bizzack, set up headquarters in a field shop building erected specially for the job. No old barn or other makeshift here. This building with 30 x 40 ft. paved floor consisted of a sectional steel frame covered with polyethylene plastic for walls and roof. Reogle's "greenhouse," as

it was sometimes called, let in enough light for precision repair work, held heat well during the cold days of early 1958 and the 1958-59 winter just passed. During the summer, openings were made in the walls to let the breeze through.

This building was purposely small—just large enough for not more than two tear-downs of large

tractors. The company's policy has been to do as much overhauling as possible at the home shop (some 100 miles away) but some heavy as well as light repairs were necessary on the job. A minimum facility of mechanic's benches and tool cabinets was maintained along one shop wall. Because the building obviously wasn't burglar proof, tools

Handy Crane Maid-of-all work—the firm's Austin-Western hydraulic crane. Handling tires was all in the day's work.



HOW REPOGLE INSURED DEPENDABLE FUEL SUPPLY

Big Storage Tank Road tanker delivering diesel fuel to the job storage tank from the Gulf bulk station.



• These three scenes show details of the 10,000-gal. above-ground fuel tank which "sowed" the 6-mile job's earthmoving fleet for three million cubic yards of grading. Shown is a Dodge Power Wagon with 1,000 gal. tank which took fuel through the project. No secondary storage was needed along this job.



and valuable parts were kept in locked cabinets during off hours.

2. The yard around the shop was leveled and lightly surfaced to provide a good work area, and much of the mechanical work was done out in the open. Scrapers were given welding or other attention here, if not out on the grade. Welding, cutting and miscellaneous tasks

that could be handled at the back end of repair trucks were often done in the yard, with the aid of the shop compressor, welder and floodlights.

3. An important part of the strategy was the use of all-wheel-drive rigs, plus use of heavy lug tires on pickups and other light vehicles.

For example, one Dodge power wagon (a.w.d.) served as a welding

truck, carrying a Lincoln welder in the pick-up bed. A work bench built on brackets cantilevered out at the back end supported a vise, grinder, etc. This unit also carried acetylene cylinders on one running board, a tool chest on the other. A 1,000-watt flood lamp was mounted on a swiveling arm, permitting direct play of light in any direction for nightshift work.

Another Dodge Power Wagon with heavy tires carried a diesel fuel tank of 1,000 gal. capacity. This rig had a tandem rear axle, with power on all six wheels. The truck was specifically planned for jobs such as this one, where fuel had to be supplied to two large shovels, a dozen scrapers, five or six heavy tractors and related equipment.

Several Ford pickups rounded out the picture of the job cars. As shown here, two of these had wooden "tents", one large enough to shelter workers during sudden rains as well as house tools and supplies. These trucks each carried a gas cylinder on the back end and served



Plastic "Greenhouse" Replogle's field shop near Mansfield, Ohio, was a demountable steel frame with polyethylene sheeting for side and roof.

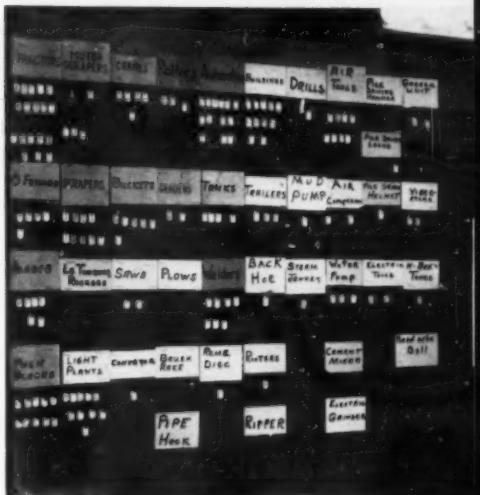
largely for towing welders around the job for light repairs.

4. Another type of equipment which helped the job keep going with minimum down time, was represented by the firm's Austin-Western hydraulic crane. This crane hoisted such heavy objects as welders, engines, bundles of reinforcing, etc. In a day's time, it would set engines on or off of trailers, help with big tire changes, and perform other spot aid. It worked out on the grade or in the shop yard, as needed.

5. An important part of Replogle's over-all organization planning is its utilization of equipment on several simultaneous highway and other jobs in Ohio. Machinery trailers hence figure importantly in the day-to-day operation. The firm has six Autocar tractors and low-boy trailers. Equipment was constantly being brought in or taken out as the Ohio Route 1 job progressed. The hydraulic crane helped with loading and unloading. A flatbed often was used to transport even a complete truck, saving on manpower as well as fuel for shuttles between widely separated jobs. A dirt ramp helped in getting big vehicles onto the trailers under their own power.

6. Lube service was handled on this job with a GMC 6 x 6 Remy truck and grease unit built by the Replogle Co. When the scraper fleet was massed in the big standstone

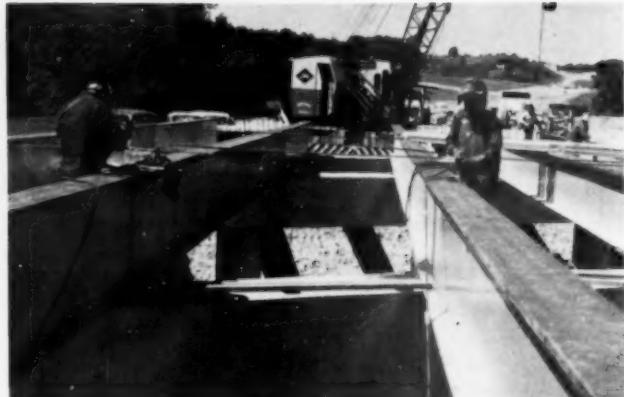
● What machines on the job? Who are they assigned to? This board in the field office helped the Replogle staff keep track.



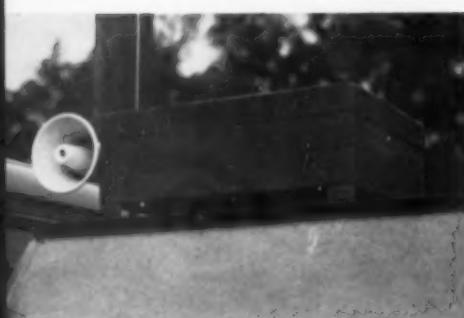
● The line-up at shift change. An International truck fitted for tire service (General) carried air supply, power wrenches, and lifting crane.



WELDER PAYS BRIEF VISIT TO BRIDGE SITE



• Illustrating the tight use of equipment these pictures show welders that were set off at an overpass deck, just long enough to weld connections. The Austin-Western crane then set the three welders and Ford V-8 engine generator on a trailer for reassignment elsewhere.



• Safety horn carried on one of the pickups, for sounding warning or signalling between shop and nearby location.



cut, the practice was to line up all scrapers and tractors in a row at shift change, at which time a good part of the greasing and fueling attention was taken care of. One grease rig took care of this job work and also caught scattered equipment along the project.

7. Fuel supplied by Gulf Oil Company was delivered by over-the-road tanker to a 10,000-gal. diesel dock located near the company office. Fuel was metered out to facilitate keeping of cost and supply records.

8. Company management for this



Acetylene Service Pronto Ford pickups, each fitted out for welding and cutting work. Common-place looking rigs—but selected and fitted out by Replogle to do their assigned chores at lowest company cost.



All-Wheel-Drive Again Another Dodge unit with all-wheel drive and heavy lug tires, shown doing its stuff as a welder's truck for light field repairs.

job, despite its nearness to urban areas, was greatly aided by the firm's Motorola radiotelephone facilities. Several supervisory cars and pickups carried mobile units, and maintained contact with the field office and firm headquarters. Equipment used on the project was kept under close management control with the help of a display board in the field office. Tugs hung on nails showed which operator was assigned to each machine. This board helped thus to keep track of personnel as well as machines, and also to tell instantly how many machines of each type were on hand as an aid to job management.

Lower Fatality Rate Due to Expressways

Evidence continues to pile up that the growing Interstate System of limited-access superhighways already is making an important contribution to highway safety. The all-time low U.S. highway fatality rate reported for 1958 by the National Safety Council is 5.6 deaths per 100 million vehicle-miles—and some of the credit must go to modern highways, states the agency.

Leader is the New York Thruway, which in 1958 recorded the low fatality rate of only 0.88 per 100 million vehicle-miles—or 17 deaths in nearly two billion miles of travel.



On the March Equipment loaded for shuttle to another project. Trailers with Autocar tractors were loaded with the help of earth ramps for large equipment, hydraulic crane for smaller units such as engines.



How North Carolina Prequalifies

Ready-Mix Sources

Procedure used with success for structural and miscellaneous concrete in the state highway program as outlined at ACI's national convention at Los Angeles.

One of the papers given at the American Concrete Institute's annual meeting, held February 23-26 at Los Angeles, was on the North Carolina procedure for approving and controlling ready-mixed concrete plants for state highway work. The paper by C. E. Proudley, materials engineer, North Carolina highways and public works commission, was read by Robert F. Adams of Sacramento in his absence.

Commercial ready-mix plants seeking to supply contractors for state highway work are given a rating, and if OK put on an approved

list. An "A" rating is for full compliance of all requirements for facilities and materials; "B" indicates some deviation from full compliance, with the ability however to supply good concrete under controlled conditions.

A plant which has conscientious owner control gets a "1" rating; one which must be watched closely by the consumer (state), a "2" rating.

Plants once rated are re-inspected periodically by engineers and inspectors from the commission's department of materials and tests. Plants which have slipped below

- Example of a well separated set of stock piles. Note concrete walls between. These however could be extended for best protection.

standard are removed from the list.

Materials used by plant owners also are inspected and tested routinely by the highway laboratory men. A training program conducted jointly by the highway commission and the industry qualifies plant employes as certified concrete technicians.

Today over 90 percent of state highway structure concrete is ready-mix, and 97 of the 107 commercial plants in the state have been approved. Also some plants just over the state line are listed.

The rating and inspection procedure came about as a result of noting that some plants consistently supplied concrete meeting all requirements, while others were unable to do so until changes were made in their methods and equipment. Rearrangement of stockpiles was one step frequently necessary; some plants stockpiled in such a way that aggregates became dirty, intermingled or segregated.

The contractors buying ready-mix for road jobs informed the state of the plants they intended to use, and asked that these plants be inspected to assure approval of the concrete. The present list of 96 thus gradually grew and the procedure became formalized. Some contractors were shunning non-approved plants and plant owners often initiated request for a rating.

Inspection of plants in the early days showed a woeful lack of technical ability and planning in most cases. Only a few ready-mix firms had any personnel who knew and understood the state's specifications, and much indifference was shown. The attitudes changed eventually as the contractor customers put on heat.



The procedure today is for a state inspector, on request, to visit the plant, discuss the state's specifications with the owner or manager, and if necessary suggest changes. The "housekeeping" in evidence is an important preliminary indicator.

The state's standard specifications are the chief basis for this inspection, and ASTM Specification C 94 is also used. Sometimes the state will impose arbitrary requirements, adopted because qualified supervision and inspection are not likely to be present at all times.

The requirements were recently outlined by the commission in a memorandum (Report No. 19, August, 1958), released to division and resident engineers, plant operators and contractors. This memorandum reviewed various aspects, and emphasized details. For example, attention was called to the requirement that each transit mixer have a revolution counter in good working order.

It noted that a representative of the commission must be present at the plant during batching for state highway use, except where otherwise provided. He must verify scale accuracy with 50 lb. weights required to be on hand.

The memorandum also spells out the method for taking cement and aggregate samples for testing in the state laboratory. Producers are required to use only aggregates that have been state tested and approved.



One of the Approved Plants

The ready-mix plant related to the stockpiles shown on the opposite page. A fully automatic plant, having electric control panels with pushbuttons and lights—making it possible to unload aggregates, charge bins, and batch materials under excellent control.

The instructions for determining the rating note that a "1" is only for plants employing a full-time concrete technician who gives all of his attention to state concrete while it is being supplied. Plants without such a man are given the

"2" rating, and a state inspector must be on hand when state concrete is being made.

A growing number of plants today have Certified Concrete Technicians—men who have passed three-day examinations following three-day schools conducted at the state laboratory. Several such short courses have been held each winter, covering design and adjustment of concrete mixtures; ability to perform tests of aggregate and concrete properly; and a final demonstration of ability to apply quality control to ready-mixed concrete operation.

This control effort it is inferred in Mr. Proudley's paper has resulted in an upgrading of ready-mixed concrete plant operation, with benefit to the industry and its various customers including the state highway contractors and the highway program itself.

- Bills designed to give direct financial assistance to the West Virginia Turnpike Commission were introduced in the state legislature. One measure would allocate to the commission taxes paid on gasoline consumed on the 87-mile toll highway between Charleston and Princeton. Another bill would have the state assume the cost of policing the pike.

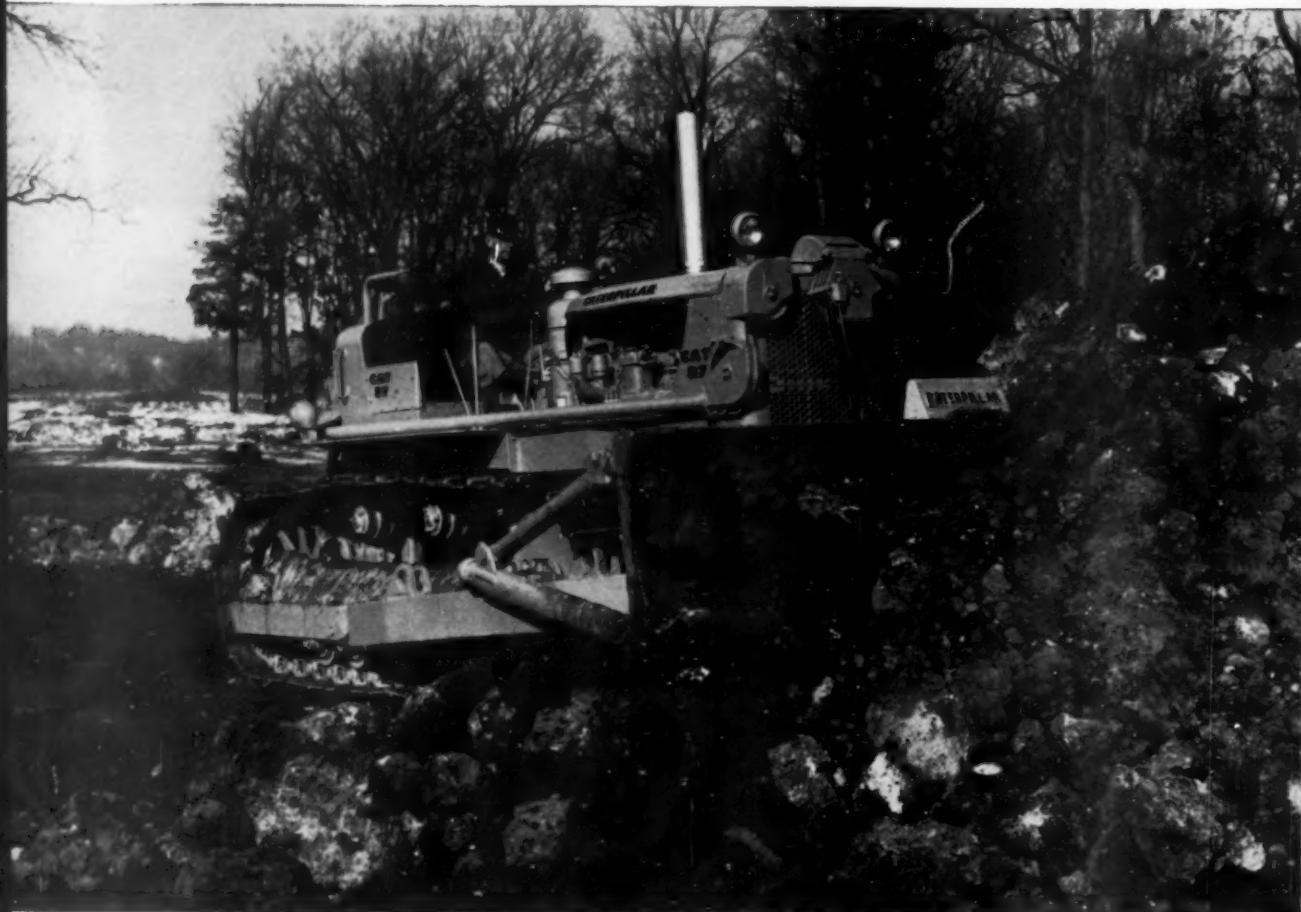
Typical Information Given in List of Approved RMC Plants

Location	Name of Plant	Class of Approval		Approved Mixers	
		Equip.	Insp.	No. of Units	Cap. per Unit, Cu. Yd.
Goldsboro	Builders Supplies Co., Inc.	A	2	2	3½
				10	5
				1	6½
Graham	Roger Moore Concrete Co.	B	2	1	2
				3	3½
				2	5
				2	6
Greensboro	F. D. Lewis and Son, Inc. (Plant No. 1—Lee St.)	A	1	4	2
				1	3½
				3	4
				1	5
				7	6
Greensboro	Ready Mix Concrete Co.	B	2	1	2
				1	2½
				2	3½
				3	4
				1	5
Greenville	White Construction Co.	A	2	5	6
				2	5
				1	6½



PROJECT PAYDIRT* pays off again...

NEW CAT D7 SERIES D



***PROJECT PAYDIRT:** Caterpillar's multimillion-dollar research and development program to meet the continuous challenge of the greatest construction era in history with the most productive earthmoving machines ever developed.

TRACTOR

THE PAYOFF FOR YOU: MORE PRODUCTION AT LOWER OPERATING COST THAN EVER BEFORE!

By any comparison the *new* Cat D7 Series D Tractor is champ in its class. It packs 140 horsepower . . . matched with 80% more lugging ability than the previous model for greater production. And it delivers this production with lower operating and maintenance costs. The payoff is increased money-making performance *on your job*—performance that no other tractor in its power range can match!

Major improvements, developed by Caterpillar's Project Paydirt, account for the increased capacity of the new D7. These improvements affect the engine, power train and undercarriage. They're explained in detail on the right.

Along with the new features, the best of the time-tested features of the Series C model have been retained. One of many examples: the exclusive Caterpillar oil clutch, which delivers up to 2,000 hours—one whole season—without adjustment!

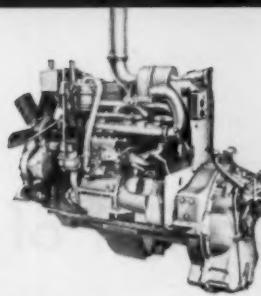
For complete facts about the leader in this class, see your Caterpillar Dealer. He's ready to give you the whole story about the new D7 Series D, as well as other achievements of Project Paydirt. He'll be glad to demonstrate, too, for this D7 really shines—in action. Say when and where—he'll be there!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

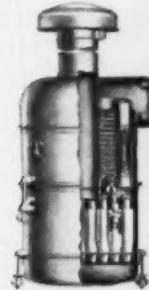
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**BORN OF RESEARCH
PROVED IN THE FIELD**



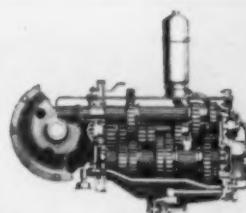
NEW TURBOCHARGED ENGINE. 140 flywheel horsepower . . . 112 drawbar horsepower make the new D7 even more productive. In-seat starting is available as an attachment. And in addition to the 9% horsepower increase, the new Turbocharged Cat Engine offers 80% more tractor lugging ability. The payoff: greater capacity to lug against big loads without stalling—for higher production, greater operating economy.



NEW DRY-TYPE AIR CLEANER. Pioneered by Caterpillar, this new dry-type air cleaner uses cyclone tubes and cellulose filter element to remove at least 99.8% of all dirt and dust from engine intake air—during every operating hour, even under the most severe operating conditions. Filter element can be cleaned and re-used. Cleaner can be serviced in 5 minutes. The payoff: longer engine life, greater economy, less maintenance.



SERVICE-FREE TRACK ROLLERS. New lifetime lubricated track rollers, carrier rollers and idlers on the undercarriage are protected by exclusive Caterpillar floating-ring seals. They need no lubrication until rebuilding, eliminate on-the-job roller lubrication. In addition, track roller life is increased by improved load-carrying design. The payoff: greater economy, longer life, less maintenance.



PRESSURE-LUBRICATED TRANSMISSION. Transmission, bevel gear and pinion are now pressure lubricated with full-flow filtered oil, another development of Caterpillar's research program Project Paydirt. And new power train components, provided to transmit greater horsepower, feature a major increase in strength in the final drive gears. The payoff: longer lived gears and bearings for trouble-free operation.

Design of a Belt-Conveyor System

What size and speed of belt is required for each component of the material handling task? What type of belting, pulley diameter? Horsepower requirements? The author reviews data on these and other questions of plant design which the contractor's staff must often consider in planning aggregate or excavation handling.

By **R. L. Peurifoy**

Professor of Construction Engineering
Texas A & M College, College Station, Texas

THE DESIGN or selection of a belt-conveyor system is often an important part of construction job planning. Well planned conveyors often can provide the most satisfactory and economical method of handling and transporting materials, such as earth, sand, gravel, crushed stone, etc. Because of the continuous flow of materials at relatively high speeds, belt conveyors have high transporting capacities.

The essential parts of a belt-conveyor system include a belt, idlers, head, tail, and takeup pulleys, a driving unit, and a supporting structure. Additional equipment, such as a feeder and a tripper may be included.

When a belt-conveyor system is used to transport materials a con-

siderable distance, up to several miles in some instances, the system should consist of several flights. Each flight is a complete conveyor unit, which discharges its load onto the tail end of the succeeding unit.

Conveyor Belts

Belts are manufactured by joining several layers of fabric, such as cotton, rayon, or nylon, into a carcass which provides the necessary strength to resist the tension in the belt. The top and bottom surfaces of the belt are covered with rubber or some other suitable compound to protect the carcass from abrasion.

A measure of the strength of a belt is indicated by the number and weight of the several layers of fab-

ric. The number of layers is expressed as 4, 5, 8, etc., ply. The weight of each layer of fabric is expressed as 28, 32, 42, etc., oz, the number indicating the weight of the piece of duck 42 in. wide and 36 in. long. Thus, a belt might be specified as 36-in. wide, 6-ply 42-oz.

Table I gives the allowable working tension and required pulley diameters for the listed conveyor belts. Belts having other widths and weights are available.

Table 2 gives the carrying capacities of troughed conveyor belts. The capacities are based on feeding the material onto the belt at a uniform rate. If feeding is not done at a uniform rate, the capacities will be less than the values given in the table. Since the capacities are based



● Typical of portable power belt conveyors available commercially today for highway, bridges and other projects.

Table 1. Allowable Working Tension and Pulley Diameter for Conveyor Belts

No. plies	Weight per ply, oz.	Width of Belt, in.						Diameter of pulleys, in.		
		20	24	30	36	42	48	Head, drive, tripper	Tail take-up snub	Bend
4	28	2,000	2,400	3,000				20	16	12
4	32	2,400	2,800	3,600	4,320			20	16	12
4	36	2,600	3,120	3,900	4,680			24	20	16
4	42			4,800	5,760	6,720		24	20	20
4	48			6,450	7,750	9,020		30	24	20
5	28	2,500	3,000	3,750	4,500			24	20	16
5	32	3,000	3,480	4,500	5,400			30	24	20
5	36	3,400	4,080	5,100	6,120	7,140		30	24	20
5	42			6,600	7,920	9,240	10,560	30	24	20
5	48			8,700	10,400	12,180	13,920	36	30	24
6	28	3,000	3,600	4,500	5,400	6,480	7,560	30	24	20
6	32			4,320	5,400	6,300	7,560	30	24	20
6	36				6,300	7,920	11,340	12,900	36	30
6	42					13,000	15,120	17,300	42	36
6	48						6,300	36	30	24
7	28			5,250	6,300	7,560	8,820	36	30	24
7	32				6,300	8,820	10,300	11,780	36	30
7	36					8,820	13,200	15,140	42	36
7	42						17,640	20,180	48	42
7	48									36

on a belt speed of 100 feet per minute, the capacities will be higher for greater speeds, and equal to the values given in Table 2 multiplied by the ratio of the actual speed divided by 100.

Table 3 gives the maximum speeds of conveyor belts when transporting various materials.

Idlers

Idlers provide the support for the belt. The loaded portion of the belt is supported by troughing idlers, while the empty portion is supported by flat return idlers. The diameters of the idlers commonly used are 4, 5, 6, and 7 in. Large-diameter rolls give lower friction and better belt protection. Anti-friction bearings are generally used with the idlers.

Table 4 gives recommended maximum spacings for troughing idlers. Return idlers may be spaced approximately 10 ft apart.

Power Required to Drive a Belt Conveyor. The total external power required to drive a loaded belt conveyor is the algebraic sum of the power required by each of the following:

1. To move the empty belt over the idlers
2. To move the load horizontally
3. To lift or lower the load vertically
4. To turn all pulleys
5. To compensate for drive losses
6. To operate a tripper, if one is used

Table 2. Carrying Capacities of Troughed Conveyor Belts
Tons per Hour for a Speed of 100 FPM

Width of belt, in.	Max. lumps		Weight of material, lb. per cu. ft.					
	Sized, in.	Un-sized, in.	90	100	125	150	160	180
20	3½	5	60	67	83	100	107	120
24	4½	8	90	100	125	150	160	180
30	7	14	142	158	197	236	252	284
36	9	18	210	234	292	351	374	421
42	11	20	300	333	417	500	534	600
48	14	24	414	460	575	690	736	828

Power Required to Move an Empty Belt

The power required to move an empty conveyor belt will vary with the type of idler bearings, the diameter and spacing of the idlers, and the length, weight, and speed of the belt. Table 5 gives the horsepower required to move an empty belt, having an average weight, at a

speed of 100 fpm for the indicated length of conveyor, using 5-in.-diameter anti-friction idlers. For speeds other than 100 fpm multiply the values in the table by the ratio of the actual speed divided by 100.

Power Required to Move a Load Horizontally

Table 6 gives the power to move a load horizontally on a belt.

Table 3. Maximum Speeds of Conveyor Belts, in FPM

Kind and condition of material handled	Width of belt, in.					
	20	24	30	36	42	48
Unsized gravel, stone, ore, or similar material	350	400	450	500	550	600
Sized coal, coke, or other breakable material	300	300	350	350	400	400
Wet or dry sand	600	600	700	800	800	800
Crushed coke, crushed slag, or other fine abrasive material	400	400	500	500	500	500
Large lump ore, rock, slag, or other abrasive material	350	350	400	400	400	400

TABLE 4
Recommended Maximum Spacing of Troughing Idlers

Width of belt, in.	30-70	Weight of material, lb. per cu. ft.	
		70-120	120-150
20	5 ft. 6 in.	5 ft. 0 in.	4 ft. 9 in.
24	5 ft. 6 in.	5 ft. 0 in.	4 ft. 9 in.
30	5 ft. 0 in.	4 ft. 6 in.	4 ft. 3 in.
36	5 ft. 0 in.	4 ft. 6 in.	4 ft. 3 in.
42	4 ft. 6 in.	4 ft. 0 in.	3 ft. 9 in.
48	4 ft. 0 in.	3 ft. 3 in.	3 ft. 0 in.

TABLE 5
Horsepower Required to Move Empty Conveyor Belts
for a Speed of 100 FPM

Length of conveyor, ft.	Width of belt, in.						
	20	24	30	36	42	48	54
200	0.33	0.45	0.56	0.71	1.01	1.40	2.28
300	0.50	0.68	0.84	1.07	1.52	2.10	3.42
400	0.66	0.90	1.12	1.43	2.03	2.80	4.56
500	0.83	1.13	1.40	1.79	2.53	3.50	5.70
600	1.00	1.35	1.68	2.14	3.04	4.20	6.84
800		1.80	2.25	2.86	4.05	5.60	9.12
1,000		2.26	2.81	3.57	5.07	7.00	11.40
1,200			3.37	4.29	6.08	8.40	13.70
1,400			3.93	5.00	7.09	9.80	16.00
1,600			4.49	5.72	8.10	11.20	18.30
1,800			5.02	6.43	9.12	12.60	20.50
2,000			5.62	7.15	10.10	14.00	22.80
2,200				7.86	11.10	15.40	25.10
2,400				8.58	12.20	16.80	27.40
2,600				9.29	13.20	18.20	29.60
2,800				10.00	14.20	19.60	31.90
3,000				10.70	15.20	21.00	34.20

Power Required to Move a Load up an Inclined Belt Conveyor

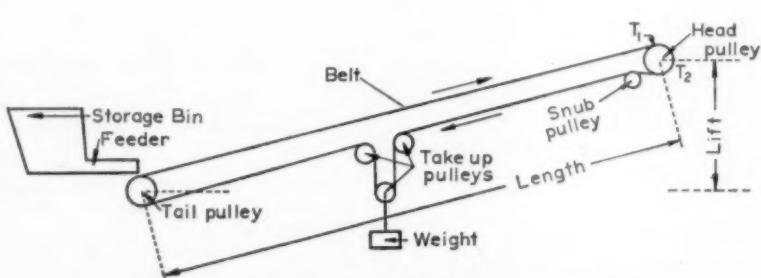
The power required to move a load up an inclined belt conveyor may be divided into two components: that required to move the load horizontally and that required to lift the load vertically. Table 6 gives the power required to move the load horizontally while Table 7 gives the power required to lift the load vertically.

Driving Equipment

A belt may be driven through a head, tail, or intermediate pulley. If a high driving force is required, it may be necessary to use more than one pulley to drive the belt, with the pulleys arranged in tandem to increase the areas of contact with the belt. Lagged pulleys will give higher friction between the surfaces of the pulleys and the belt than bare pulleys, which will reduce the danger of slippage.

The power required to move a belt is transmitted to the belt

through friction between the surface of the pulley and the belt. The loaded section of the belt coming onto a head-drive pulley is subjected to a high tension, while the empty section of the belt leaving the pulley on the slack side is subjected to a much lower tension. The effective driving force, which is transmitted to the belt, is equal to the difference between the tight-side tension and the slack-side tension, expressed in pounds.



● Diagram showing nomenclature of the parts and elements in a conveyor system unit.

$$T_e = T_1 - T_2 \quad (1)$$

where T_e = effective driving force

T_1 = Tension in tight side of belt

T_2 = tension in slack side of belt

The effective driving force, T_e , required to transmit a given horsepower to a belt is given by the formula

$$T_e = \frac{33,000 \times \text{horsepower}}{\text{speed of belt, fpm}} \quad (2)$$

The ratio $\frac{T_1}{T_e}$ is defined as the pulley tension factor.

The factor may be expressed as

$$F = \frac{T_1}{T_e} \quad (3)$$

If F and T_e are known, the minimum T_1 may be obtained, which is equal to FT_e .

Table 8 gives the values for tension factors for driving pulleys.

The power loss in the driving equipment, such as a speed reducer between the motor and the driving pulley, will amount to 5 to 10 percent of the output of the motor.

Power Required to Turn Pulleys

The pulleys used on belt conveyors usually are furnished with babbitt bearings. The power required to overcome friction in the bearings can be obtained from Table 9. All of this power except for the drive pulley must be transmitted to the pulleys through the belt. Thus T_e and T_1 must include the tension necessary to transmit this power.

Example. Use the principles and tables previously given to design a belt-conveyor system to transport 300 tph of unsized crushed stone for the given conditions:

(Continued on page 75)

To handle BIG JOBS profitably you need:

BIG SCRAPERS

BIG PUSHERS

BIG GRADERS

ONLY from LeTourneau-Westinghouse
can you get all three





Here's how
L-W "BIG ONES"
measure up...

CAPACITY...

SPEED...

DEPENDABILITY...

B Tournapull® with
Fullpak® scraper

"--Fastest loading"

28 YDS HEAPED . . . and two years of load-weight tests prove B 'Pulls* consistently load a *greater percentage* of capacity than any other scraper. Fullpak's low, wide bowl, deep-bellied apron and arched tailgate "boil" the dirt for faster heaps, fewer voids, more pay-yards every load.

INSTANT-RESPONSE

ELECTRICITY controls bowl lift, tailgate, and apron. For high-speed maneuverability, you have electric kingpin-steer. With either torque-converter or 10-speed step-gear transmission, you work or travel at *fastest* practical speed. And this 335-hp machine travels at over 30 mph!

EXCLUSIVE L-W POWER-TRANSFER DIFFERENTIAL

and "duckwalk" ability *keeps you working* at normal speeds in soft going. Downtime is reduced, because electric-control system *eliminates* most "trouble-maker" parts. All components are easy to reach. Tournapull *simplicity* saves you money.

Ask for a demonstration!



Twin-C*
Push-Tractor



L-W 660
Motor grader

"--Fastest pushing"

"--Fastest working"

436 HP, 40-TON WORK-WEIGHT let Twin-C push-load today's *biggest* scrapers *fast*. 4-wheel drive on 7'-high, 2½'-wide tires, with L-W power-transfer differentials, provide the needed flotation and traction to work steadily in all types of materials.

MORE BLADE WORK...FASTER ...than any other grader, of any size, at any price... proven by owners everywhere! Biggest of L-W's 7 sizes of Adams* graders, 660 POWER-Flow® is nearly 14 tons of grader applying 190 hp to your work through a torque converter. Rugged 160-hp "stick shift" 660 also available.

PUSH-LOAD FASTER with *non-stop shift*... *kingpin-steer* for faster maneuvering and positioning... 20-*mph* speed. With synchronized torque converters, constant-mesh transmissions, Twin-C matches scraper speeds better, gives scrapers a fast-speed shift-saving boost out of cut.

WORK AT FASTEST POSSIBLE SPEED AUTOMATICALLY... with torque converter plus tail-shaft governor on 660 POWER-Flow. Speeds to 27.4 mph! Positive blade control through BIG 63" circle. Blade movement is fast... you go from deep ditch-cut position to high bank-cut in less than a minute!

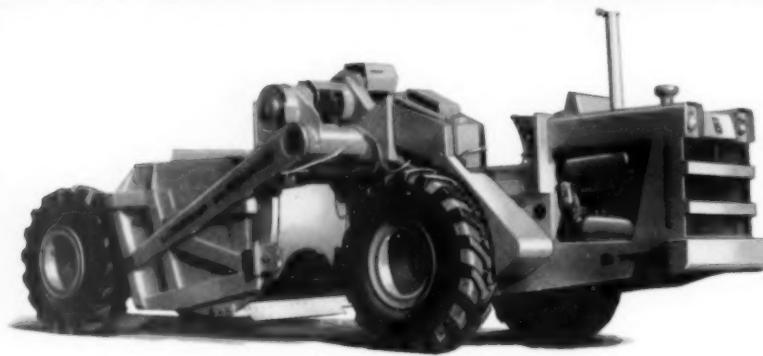
JOB-PROVEN RUGGEDNESS: Twin-C's two transmissions, two torque converters, two differentials, and other assemblies, are standard L-W components proven on thousands of earth-moving jobs all over the world. Twin-C is built big and strong to handle heavy work. Entire unit is a heavy-duty "reserve strength" machine.

Get full details now!

ALL WELL-KNOWN ADAMS STRENGTH FEATURES are standard on the "660's": continuous-welded one-piece frame, full-floating rear axle, welded bar-and-plate front axle, anti-friction bearings on all gears and shafts, life-time lubricated universal joints, and rubber-mounted engine.

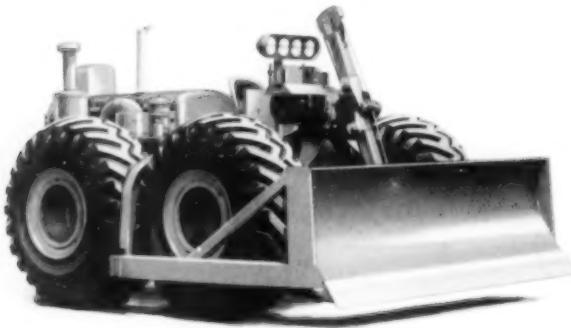
See one in action!

...the "before and after" tool



D TOURNAPULL® with 9-yd capacity saves you money on smaller-yardage scraper work around your job. It builds haul roads... prepares cuts and fills... shoulders and backfills... stockpiles topsoil... and handles miscellaneous clean-up work on even the biggest projects. "D" has 138 hp, 29.5-mpg speed, electric controls, and is as rugged as *any* scraper.

...rubber-tired specialist on **ANY** project



Litho in U.S.A.

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...add an equipment expert as a "partner"

Job-in and job-out, your L-W Distributor can be your biggest profit booster. He will serve you as a non-salaried partner... who's an expert on equipment problems. Remember: while you are handling only a few contracts a year, he is associated in some way with *dozens* of earthmoving jobs.

Put his experience and know-how to work for you. Call him in before you prepare your bids. Get his suggestions on how you can handle the job at lowest cost. Let him analyze your fleet, to help determine which rigs can still earn their keep... which ones need overhauling or reconditioning... and which, if any, you should trade in on new machines to protect your profit margin.

Your L-W Distributor can be a big help, too, in planning an efficient *maintenance* setup. He'll check over your parts and replacement stocks, and help arrange a schedule so his service department and yours can work together with greatest efficiency.

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CONVEYOR SYSTEM

(Continued from page 70)

Length of conveyor, 1,600 ft.

Vertical lift, 150 ft.

Slope of conveyor, 9.4 percent

Maximum size stone, 8 in.

Weight of stone, 100 lb. per cu. ft.

Use 5-in.-diameter idlers, with antifriction bearings

Table 2 indicates a minimum belt width of 24 in., based on the size stone to be transported. However, Table 5 indicates that this width is not practical for lengths greater than 1,000 ft. Consider a 30-in.-wide belt.

Capacity at 100 fpm, 158 tph

Minimum required speed,

$$\frac{300 \times 100}{158} = 190 \text{ fpm}$$

Maximum speed, from Table 3, 450 fpm.

Since T_e will be less if the belt is operated at a high speed, as indicated in formula (2), consider a speed of 450 fpm.

The power required will be as follows:

To move the empty belt,

$$\frac{4.49 \times 450}{100} = 20.2 \text{ hp}$$

To move the load horizontally = 15.5 hp

To lift the load vertically = 45.0 hp

Subtotal = 80.7 hp

To turn pulleys, 4% of 80.7 = 3.2 hp

Subtotal = 83.9 hp

To overcome drive losses, 8% of 83.9 = 6.7 hp

Total = 90.6 hp

Use a 100 hp electric motor. Effective pulley force,

$$\frac{T_e, 33,000 \times 83.9}{450} = 6,150 \text{ lb}$$

The minimum value of T_2 will be the tension on the slack side of the tail pulley plus the vertical component of the weight of the slack portion of the belt. The minimum tension of the slack side at the tail pulley should be 20 lb. for each inch of belt width. Assume that the belt weighs 10 lb. per ft.

TABLE 6. HORSEPOWER REQUIRED TO MOVE LOADS HORIZONTALLY ON CONVEYOR BELTS

Length of conveyor, ft	Load, tons per hr							
	150	200	250	300	350	400	500	600
200	1.1	1.5	1.8	2.2	2.6	2.9	3.6	4.4
300	1.6	2.2	2.7	3.3	3.8	4.4	5.5	6.6
400	2.2	2.9	3.6	4.4	5.1	5.8	7.3	8.7
500	2.7	3.6	4.6	5.5	6.4	7.3	9.1	10.9
600	3.2	4.2	5.3	6.4	7.4	8.5	10.6	12.7
800	4.1	5.5	7.5	8.2	9.5	10.8	13.7	16.4
1,000	5.0	6.7	9.2	10.0	11.7	13.3	16.7	20.0
1,200	5.9	7.9	10.8	11.8	13.8	15.7	19.8	24.0
1,400	6.8	9.1	12.4	13.7	15.9	18.1	23.0	27.0
1,600	7.7	10.3	13.9	15.5	18	21	26	31
1,800	8.7	11.5	14.4	17.3	20	23	28	35
2,000	9.6	12.7	15.9	19.1	22	25	32	38
2,200	10.5	13.9	17.4	21.0	24	28	35	42
2,400	11.4	15.2	18.9	23.0	27	30	38	46
2,600	12.3	16.4	20.0	25.0	29	33	41	49
2,800	13.2	17.6	22.0	26.0	31	35	44	53
3,000	14.1	18.8	23.0	28.0	33	37	47	56

TABLE 7. HORSEPOWER REQUIRED TO LIFT A LOAD

Net lift, ft	Load, tons per hr							
	150	200	250	300	350	400	500	600
10	1.5	2.0	2.5	3.0	3.5	4.0	5.1	6.1
15	2.3	3.0	3.8	4.5	5.3	6.1	7.6	9.1
20	3.0	4.0	5.1	6.1	7.1	8.1	10.0	12.0
25	3.8	5.1	6.3	7.6	8.8	10.0	13.0	15.0
30	4.5	6.1	7.6	9.1	11.0	12.0	15.0	18.0
40	6.1	8.1	10.0	12.0	14.0	16.0	20.0	24.0
50	7.6	10.0	13.0	15.0	18.0	20.0	25.0	30.0
75	11.0	15.0	19.0	23.0	27.0	30.0	38.0	45.0
100	15.0	20.0	25.0	30.0	35.0	40.0	51.0	61.0
125	19.0	25.0	32.0	38.0	44.0	51.0	63.0	76.0
150	23.0	30.0	38.0	45.0	53.0	61.0	76.0	91.0
200	30.0	40.0	51.0	61.0	71.0	81.0	101	121
300	45.0	61.0	76.0	91.0	106	121	152	185
400	61.0	81.0	101	121	141	162	202	242

Tension at tail pulley,

$$30 \times 20 = 600 \text{ lb}$$

Weight of belt,

$$150 \text{ ft} \times 10 \text{ lb} = 1,500 \text{ lb}$$

Total value of $T_2 = 2,100 \text{ lb}$

Minimum value of $T_1 = T_e + T_2 = 6,150 + 2,100 = 8,250 \text{ lb}$

Use a 5-ply 48-oz belt whose tensile strength is 8,700 lb.

Tension factor,

$$F = \frac{T_1}{T_e} = \frac{8,250}{6,150} = 1.34$$

Table 8 indicates that a single lagged drive pulley with a 230 degree arc of contact will be satisfactory. A snub pulley will be required to provide this arc of contact.

From Table 4, the maximum spacing of troughing idlers will be 4 ft. 6 in. Reduce this spacing to 1 ft. 6 in. under that portion of the belt which receives the load by adding four extra idlers.

The design should provide for the following:

Belt, 5-ply, 48-oz, 30-in. wide

Motor, 100 hp electric

Head pulley, 36 in. diameter

Tail, take-up, and snub pulleys, 30 in. diameter

Bend pulleys, 24 in. diameter

Troughing idlers, $1,600 \div 4.5 = 356 + 4 = 360$ each

Return idlers, $1,600 \div 10 = 160$ each

If 6-in. idlers are used instead of 5 in., the power required to move the belt and the load will be re-

Table 8. Tension Factors for Driving Pulleys

Arc of contact, deg.	Bare pulley	Lagged pulley
<i>Single-pulley drive</i>		
200	1.72	1.42
210	1.70	1.40
215	1.65	1.38
220	1.62	1.35
240	1.54	1.30
<i>Tandem drive</i>		
360	1.26	1.13
380	1.23	1.11
400	1.21	1.10
450	1.18	1.09
500	1.14	1.06

TABLE 9
Per Cent of Shaft Horsepower Required to Overcome Pulley Friction

Length of conveyor, ft.	Slope of conveyor, per cent				
	0	0-10	10-19	19-29	29-36
200	14	11	8	6	5
250	12	10	7	5	5
300	11	8	6	5	4
400	9	6	5	4	4
500	7	6	5	4	3
600	6	5	4	3	3
700	5	4	4	3	3
800	4	4	3	3	3
1,000	4	4	3	3	3
2,000	4	4	3	3	3
3,000	4	3	3	3	3

duced about 17% of $(20.2 + 15.5) = 6.1$ hp, while if 7 in. idlers are used the reduction will be about 30% of 35.7 = 10.7 hp. If the conveyor will be used sufficiently long, the reduction in the cost of energy and the better performance of the belt may justify the additional cost for larger idlers. Also, the use of larger idlers will reduce the tension in the belt, which should increase its life.

The information used in this article is taken from Professor Peurifoy's book, CONSTRUCTION PLANNING, EQUIPMENT AND METH-

ods, published by McGraw-Hill Book Company.

Old Concrete Salvaged as Road Aggregate

The rambling piles of broken concrete, frequently seen along the highways of rock-starved northwest Iowa, have proved to be "money in the till" to the Iowa State Highway Commission.

Temporarily piled along right of ways, following the removal of curbs, flumes and bridge abutments, and from highways which have been

widened or rebuilt, the old concrete is being crushed for use as temporary surfacing for detours and run-arounds, and the surfacing of mailbox turnouts and driveways.

The material can be produced at a substantial saving over the price which has to be paid for shipped-in rock. In the Sioux City area, where rock quarries are almost non-existent, Earl Capel, District Engineer for the Iowa state highway commission, states that the price of shipped-in rock to Sioux City is approximately \$4.25 per cu. yd., crushed concrete will range from \$2.10 to \$3.50, depending on the location of the stock piles, and the quantities being crushed.

Mr. Capel also stated that crushed concrete has proven its superiority to ordinary gravel in its compacting qualities, and in its ability to "stand-up" under heavy traffic conditions.

Since the Commission first instituted the utilization of broken concrete, the demand for this material has increased and it is anticipated that many more uses will be found for this material. Each autumn, the highway commission advertises for bids for the crushing of the concrete material salvaged during the preceding construction season, and many qualified contractors have been attracted to this operation as a means of occupying their men during the slack winter months.

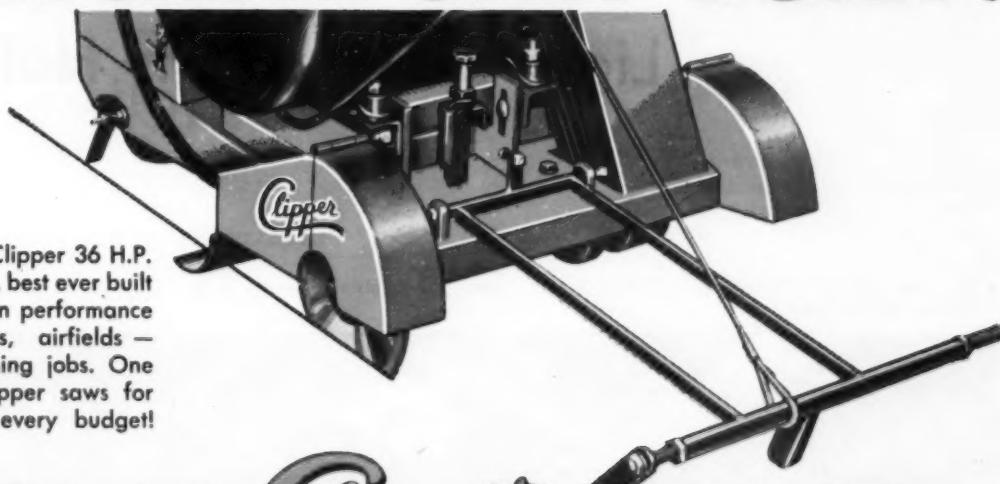
In those areas of the state where quarries are plentiful and crushed rock can be produced for less than the crushing of old concrete, the reclaimed material is used for earth and ditch fills, rip rap for lake and river banks, and as a soil erosion preventative along cuts and hill-sides.



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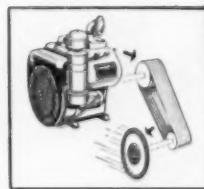
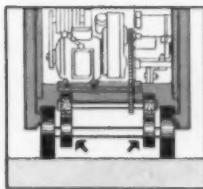
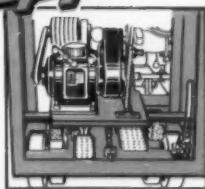
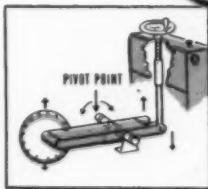
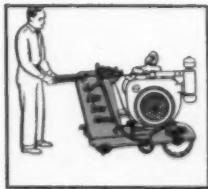


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● Lightweight steel I-beams being set to support concrete bridge decking temporarily in the 18th Street viaduct in Kansas City, Kansas.

Light Steel Beams Help Do

- Six men stripped 17 Jones & Laughlin Junior Beams and 18 plywood sheets in the falsework of this bay in 20 minutes.

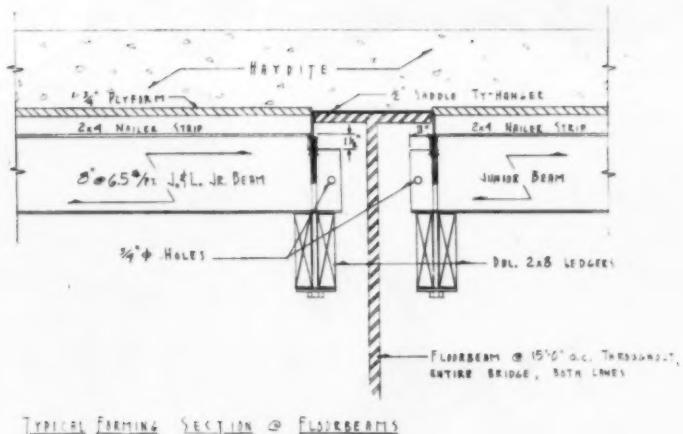


After the Jones & Laughlin steel joists were in place, plywood sheets were nailed to the nailer strips. Every component of the falsework manually handled from the top work level.

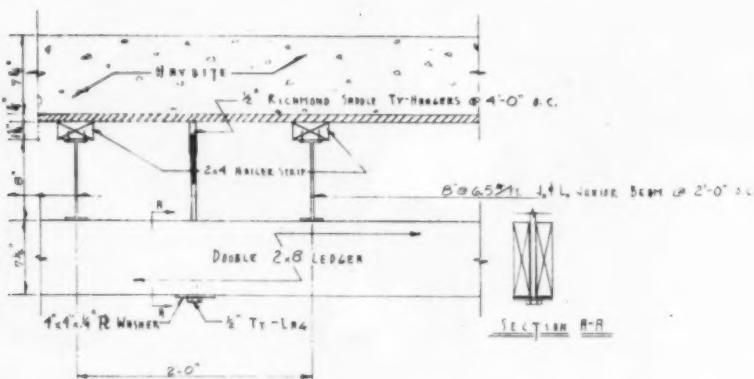


Fast Deck Forming Job

Contractor won bonus for early completion of structure linking downtown Kansas City (Mo.) area with Kansas Turnpike.



TYPICAL FORMING SECTION @ FLOORBEAMS



TYPICAL DECK-FORMING INSTALLATION — PARTIAL SECTION

Deck-forming details for the 18th Street viaduct show how Jones & Laughlin 8-in. Junior Beams were used in the falsework. Upper: Partial section. Lower: Typical forming section and floorbeams.

A cost-saving system of bridge deck-forming for concrete roadways recently enabled J. A. Tobin Construction Co., Kansas City, Kansas, to make record time in completing the half-mile-long 18th Street viaduct in the new Kansas City Expressway.

The four-lane bridge is a link in the Kansas Turnpike and was built for the Kansas Turnpike Authority. J. A. Tobin Construction Company's contract provides important savings in addition to those derived from the improved construction method. For every day under the allowed 180 days between the closing of the old viaduct (July 21, 1958) and the opening of the new one, Tobin is to receive a \$1,500 bonus.

Use of the unique deck-forming method enabled completion of the bridge decking by September 20. The Kansas Turnpike Authority accepted the bridge on September 26, thus cutting 114 days off the allowed time for opening the viaduct to traffic. However, the opening day was October 20 which allowed time for dressing the slopes and completion of paving. The time saving resulted from simplification of this phase of the work, which cut considerably the number of man-hours required.

Tobin's new system is based on the temporary use of lightweight steel I-beams in the falsework that supports the reinforced concrete bridge deck until it has set. These



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ROADS AND STREETS, April, 1959

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WINTERTIME WAS SWAMP



• Over-all view of swamp excavation showing draglines operating from both sides. Depth of the excavation went down to 14 ft. in some areas. Dragline work was subcontracted to J. G. Hull of Markesan, Wis.

How Wisconsin contractor used tested procedures—plus some new tricks to excavate and backfill marshes in months that once kept road contractors around the stove.

ABOUT THE CONTRACTOR

From a start as a partnership doing small concrete jobs in 1912, L. G. Arnold has built his company, L. G. Arnold, Inc., into a business which did \$5,500,000 in 1958. The company currently hires an average of 350 full-time employees with a \$1,400,000 annual payroll.

After serving as engineer and assistant superintendent in charge on Wisconsin-Minnesota Power Company's Wissota Dam in 1915, L. G. Arnold went into partnership with Andrew Larson. The pair built sidewalks, driveways and basements. From there, they expanded into other work. Arnold bought out his partner in 1927 and began general contract work. Today, L. G. Arnold is still president and actively engaged in the management.

Almost any northern contractor will tell you that when the temperature dips to zero and the frost works two feet into the ground, it's high time to sit by the fire and wait for spring. But in Northern Wisconsin this past winter, men and machines defied the severe cold to move dirt fast—using the hard freeze to advantage.

Working on two adjoining interstate projects, the veteran Eau Claire contracting firm of L. G. Arnold, Inc., banked on experience and specialized earthmoving techniques to solve the tough winter problems. Arnold was awarded two adjoining contracts covering 3.826 dual-miles of Interstate Route 94 near Elk Mound late in 1958. The jobs were complicated by a series of marshes which—according to the time schedule—had to be excavated and backfilled during the winter months. Operating at this time of the year meant cracking

FILLING TIME

and keeping open the borrow pits—without boosting earthmoving cost to a prohibitive level.

The western 2,197 miles was awarded at \$390,961 on October 3 for grading, subbase and structures (200 calendar days). The eastern 1,629 miles was let November 17 at \$882,777, with 275 calendar days for completion. The combined job includes about 250,000 cu. yd. of marsh and 400,000 cu. yd. of unclassified excavation. Some shale is also expected on the eastern project when work begins in the 1959 spring.

Work started on the western project October 6 and on the eastern project November 20. After clearing and grubbing on 124 stations (subcontracted to Siren Construction Co., of Siren, Wisconsin), earthmoving was started October 20 on the western project.

● *Excavating the Swamps.* It was necessary to begin the marsh excavation in winter in order to take advantage of relatively dry soil conditions. The swamps held lower-than-average moisture because of recent sparse rainfall. Also taken into consideration was the coming spring rainy period which would make marsh excavation difficult, if not impossible. Delaying this excavation would, in turn, delay later work and throw paving off schedule. An additional benefit of completing

- In borrow pits that had been stripped before cold weather set in, frost penetrated to a lesser depth than those pits which were not stripped. Previously stripped borrow frost was broken with a LeTourneau K30 rooter, pulled by a Cat D8 tractor.



● Mats of elm logs were used under the Northwest draglines to prevent bogging down. Elm was chosen because of its strength and springiness.

WINTER JOB HIGHLIGHTS

- Dryer marsh areas were dug out in advance; wetter swamps backfilled immediately behind draglines.
- Swampy spots 2 to 14 ft. deep were excavated by two draglines on log mats, progressing along opposite edges.
- Instead of a rolling surcharge, the "press in" method of displacing muck was used in backfilling, expedited by the power and weight of a pair of very heavy tractors.
- Borrow pits were opened through frost by a hydraulically mounted ripper on heaviest tractor. Stripping during early weeks of winter resulted in less frost penetration.
- Hauling of borrow was fast and economical over frozen haul roads.





● Sub-zero cold turned sand into rock hard material. Shown here, tractor dozes overburden into former borrow pit.

● Ripping on 36-in. centers, Cat D9 tractor with No. 9 ripper breaks up frost to uncover borrow.



● D8s team up during swamp backfilling operations. Dozer blades were used to ram backfill into place. This technique proved a better method of displacement and compaction than using a rolling surcharge.



● Illustrating method used to ram backfill into place. Power and weight of two Cat D8 tractors, working side-by-side, were utilized to gain superior displacement and compaction. Innovation succeeded use of rolling surcharge.

both the excavation and backfill in winter, is the natural compaction gained from settling during the months before the roadbed is brought to grade.

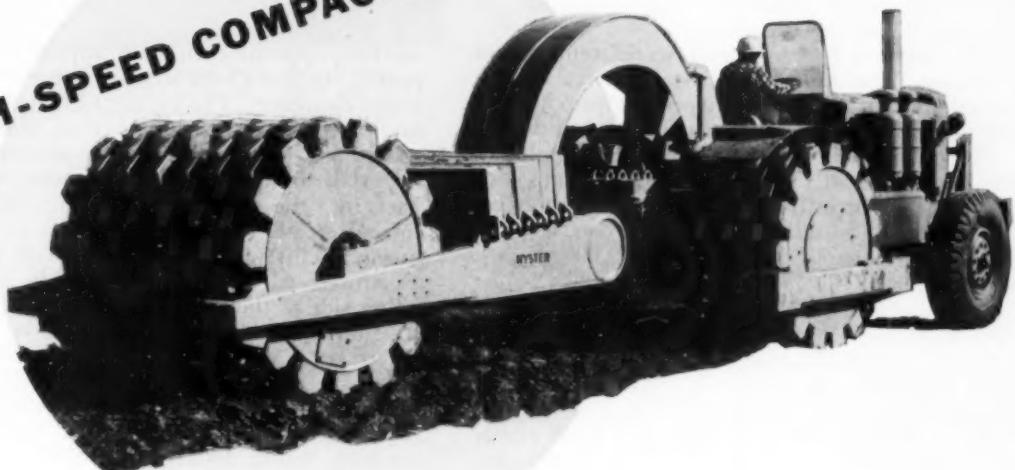
By late December Arnold had completed excavation and backfilling of marshes. Explaining how the job was accomplished, F. L. Carr, company vice president, pointed out, "The swampy areas, six in all, were first tested for moisture content. Those with a lower moisture content, which would stand up well after excavation, were dug out well in advance of backfilling. Marshes with a high moisture content were excavated and backfilled immediately."

Marsh excavation was subcontracted to J. G. Hull of Markesan, Wisconsin, a long-time specialist in this type of work. Hull began on October 6 on the west project.

The six major swamp areas on both projects range from a maximum of 14 ft. depth to a minimum of 2 ft. Composition is essentially silt and peat. Directly below the marsh lies a thick layer



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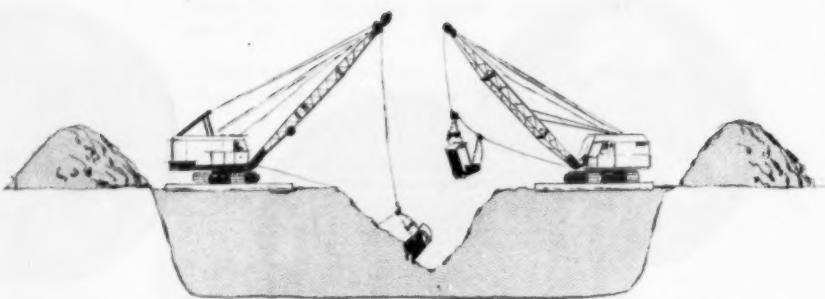
of nearly impervious clay one to two feet in thickness. Beyond the clay is a solid base of sand and gravel.

The most westernly swamp was excavated well in advance of backfilling because it stood up well. An estimated 77,000 cu. yd. was removed from this area. Toward the center, a marsh 3,600 ft. in length and 2 to 6 ft. in depth, was excavated with bulldozers and draglines. Material removed totaled 32,000 cu. yd. At the western project's eastern end, 1,300 ft. of marsh had 67,000 cu. yd. of material removed. This cut was back-filled immediately because of its extremely wet condition. The fourth small swamp area on the east end of the western job involved approximately 4,000 cu. yd., which was excavated with bulldozers.

The eastern project's marsh excavation included 700 ft. of muck at the western end, running 4 to 12 ft. deep. An estimated 32,000 cu. yd. was removed here. In addition, a 1,300 ft. section ran 2 to 14 ft. in depth and required 39,000 cu. yd. of removal.

Nearly all marsh excavation was accomplished with draglines, although dozers were used whenever the material was dry enough. Hull's equipment included a Model 95 Northwest with $3\frac{1}{2}$ yd. dragbucket and a Lima SC 703 with $2\frac{1}{2}$ yd. bucket. These machines formed the basic marsh excavating units. Although both draglines are crawler-mounted, the marshes were too soft to provide adequate footing, and mats made from elm logs were used. Each mat consisted of logs about a foot thick and 30 ft. long held in 6 ft. widths by cables. Eight to 10 of these mats were used along the swamp to provide a roadway. The draglines lifted them into place progressively ahead to build their own mat roads as the excavation progressed.

The draglines began at one end of a swamp



● How swamps were excavated. Draglines mounted on log mats handled removal of unsuitable material. Muck was cast on each side of excavation to form dike. This prevents ooze, removed from bottom portion of excavation, from running back into hole after it has been cast back of pile. Muck disposal, in this manner, also minimizes the amount of shaping necessary for slopes and shoulders.

working opposite each other approximately 130 ft. apart. Machines were slightly staggered to provide boom clearance. The excavated material was piled on both sides of the cut. Thus stockpiled, the wasted soil provided a dike to prevent the wetter material, found toward the bottom, from oozing back into the cut once taken out. Silty material, forced ahead of the backfill, also had to be removed. This was accomplished with a Model 41 Northwest with clamshell. A 75-ft. easement on either side of the right-of-way was provided by the state for disposal of marsh excavation. In general, the roadway's completed grade will be 4 to 6 ft. above the level of the swamp. Initially, the backfilling was carried one foot above swamp elevation. After the backfilling has settled during the remaining winter months, additional borrow will be hauled in to bring the roadbed up to finished grade.

Stockpiled marsh excavation will be spread on slopes of 20:1 from a point 6 in. below the top of subgrade and outward a distance of 20 ft. From this point it will be carried out level. The present system of piling the waste on each side of the roadway will greatly reduce the amount of dozer work necessary to shape the waste material and the finished slopes.



● In December: one of Arnold's scrapers, seven of which moved 33,000 cubic yards in four 9-hour days over a 4,000 ft. haul.



● Keeping the winter haul road well maintained, Cat No. 12 Motor Grader takes the rough edges off return road to borrow pit.

● **Backfilling Methods.** The use of specialized earthmoving equipment contributed much in overcoming the problems brought on by the cold temperatures. The borrow pits, strategically located along the roadway, yield a sandy material with some incidence of clay. This borrow exceeds specifications for material quality and provides a superior backfill in the marsh areas, as well as in those areas which do not require marsh removal. The top portion (about 2 ft.) was stripped from most of the borrow pits during the early stages of grading. This practice helped limit frost penetration to from 12 to 18 in. when the borrow was ready for use during the colder weather. In those borrow areas which had not been stripped in advance, frost penetrated to 2 ft. or more.

Ripping proved the best solution to opening up the borrow. In order to remove the deep frost Arnold used a D9 and No. 9 hydraulic rear-mounted ripper. The hard frozen sand with its clay binder proved hard as rock. It was found that the best fracture pattern could be obtained by ripping in a grid pattern on about 36 in. centers (see *Roads and Streets*, January, 1959, page 90). Since the frost broke into chunks it could not be used as borrow. This material was stockpiled with dozers for use in releveling the borrow areas.

In previously stripped areas the shallower frost was broken up with a tractor-drawn LeTourneau K30 Rooter. This material was also dozed into stockpiles for releveling borrow pits.

When the frost was removed from a section of borrow, the earthmovers took over. Essentially equipment was divided into two spreads: large high-speed rubber-tired tractor-scrapers units for long hauls and crawler tractor-scrapers and smaller rubber-mounted rigs for the shorter hauls. Push-



● At the winter job site: F. L. Carr, vice president, L. G. Arnold, Inc.; Kenneth Hogenson, State of Wisconsin area construction supervisor; Phil Dudenhofer, superintendent in charge of grading for L. G. Arnold, Inc.

loading was done with three Cat D9s and one Allis-Chalmers HD21. Haul roads were maintained with one Adams 660 and two Cat No. 12 Motor Graders, all equipped with large aircraft-type tires for greater flotation and minimum disturbance of the finished grade.

Backfilling of the swamp cuts was accomplished with still another specialized technique. Originally, specifications called for using a rolling surcharge as a method of backfilling. The weight of this additional material was expected to hasten settling and prevent the trapping of unsuitable material. It was found, however, that this method was inadequate for proper displacement and compaction. In its place, bulldozer-equipped tractors were used to actually ram in the backfill.

A Model 41 Northwest clam removed the accumulated ice and silt from ahead of the backfill. Haul units dumped their loads as near to the edge as possible. Two D8s, working beside each other, dozer to dozer, pushed the fill forward into the excavation. As the material moved downward into the excavation, the tractor operators lowered the dozer blades. This operation, which requires considerable skill and teamwork, rammed the backfill into place. As a result of this technique, the contractor not only eliminated the necessity of handling a rolling surcharge, but was also able to gain superior displacement and compaction plus speeding up the backfilling operation.

● **High Production.** Compensating for the disadvantage of the extreme cold was the hard-frozen surface of the haul roads. Rubber-tired rigs moved at top speeds; a factor that greatly influenced daily production figures. In four 9-hour days, with a

(Continued on page 134)

Cement Treatment of Subgrade

Spotlighted at ACI Meeting

California has put down large yardage of such treatment, which has been highly successful in minimizing pumping at concrete road joints, according to latest available data.

One of the papers which received considerable attention at the American Concrete Institute's recent annual convention in Los Angeles, was that presented by assistant state highway engineer of California, J. W. Trask, on cement treated subgrades under concrete pavements. The California experience dates from a small beginning made in 1945 and today is extensive.

The state adopted the practice of hardening the subgrade with a cement admixture and covering it with a bituminous membrane, in an effort to create an erosion-resistant layer immediately beneath the concrete. Mr. Trask's paper is in a sense a continuation of previous reports, one by Hveem at ACI's annual convention in 1951 and one by Withycombe given at the 1951 WASHO conference.

Cement treated base in California is defined as the mixing of mineral aggregate, cement and water by road mixing or plant mixing and applying a bituminous seal. The material may be that found in the roadbed, or a select or imported material or combination. Portland cement is added in amount ranging from $2\frac{1}{2}$ to 5 percent by weight of dry aggregate, as specified for each job. There is no strength requirement. Mixing is done usually between the paving forms, to a depth specified. If the contractor elects to mix the material centrally, he has the option as to the type of mixer. But, as with road mixing the problem is to mix, transport, place and compact the mixture within an hour.

Mr. Trask's paper describes the

procedure used on a typical recent project, that of U.S. 40 just west of the Nevada line, paved in 1958. The problem here was to keep sufficient water supply, since the processing must be geared to the brief period of setting of the cement. The bituminous curing application was at 0.2 gal. per sq. yd.

One of the problems particularly mentioned is that of securing a uniform cement content, transversely and longitudinally throughout the subgrade layer, as well as from top to bottom of treatment. Factors contributing to lack of uniformity include non-uniform disposition of cement, variation in mixing depth, and deficiency of materials if processed in windrow. The state is now concerned with making tests to determine what degree of non-uniformity is permissible without affecting the service characteristics sought.

The first trial of cement treatment was made to create a transition zone between the concrete and the underlying material, with the purpose of preventing shifting or movement of the subgrade under the pumping action of joints. It was also the aim to prevent erosion by water under the pavement. It wasn't expected that all joint faulting or other defects would be eliminated, but it was hoped that mud pumping with its attendant loss of material would be prevented and the magnitude and frequency of faulting would be reduced.

The verdict from studying early profilograph records is that the practice should continue. Following this verdict in 1950 some 20 million square yards of cement

treated subgrade has been placed in the California state highway program. Continuing study of profilograph records show that California has no serious faulted pavements where such treatment has been included. There are a few cases where the pavements are faulted as much as $\frac{1}{8}$ in. This is in contrast with 1944 records which showed need to build up bituminous patches to a depth of two inches at some of the worst faulted joints.

Mr. Trask notes that the term "cement treated subgrade" has been adopted in the belief that "soil stabilization" or "soil cement" are not truly descriptive of the state's aims and purposes. If and when the thickness of the treatment is increased, for the purpose of creating added structural support, as under a bituminous surface, the term "cement treated base" is used.

Univac Computer for Jersey Turnpike

The New Jersey Turnpike, whose 131 miles of divided highways constitute the nation's most heavily traveled toll road, will be the first turnpike to install the New Univac Computer, the first solid-state data processing system in actual commercial operation.

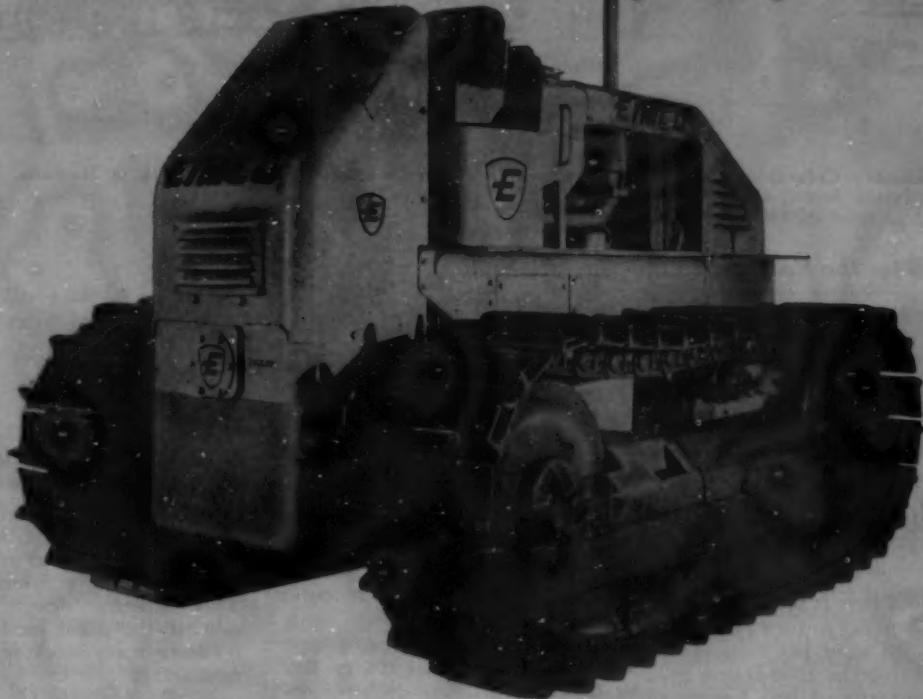
A contract has been signed with the Remington Rand Division, Sperry Rand Corporation, for delivery of the computer this summer. It will be housed at the turnpike's headquarters in New Brunswick, New Jersey, replacing a Univac 60 system.

The new computer, which is capable of making over 10,000 additions or subtractions per second and which has a "memory" storage of 50,000 characters of information, can be used for many other purposes including cost distribution and personnel records.

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8-399

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• Albert Lalonde's Cedarapids Challenger plant seen in action on Interstate highway work in Montana.

Aggregates for the Road Program—

Twin-Jaw Outfit Crushed 500 TPH

Contractor made fast work of 180,000 ton production job for Montana highway project.

Once upon a time it took a "flock of equipment" to turn out 500 tons of crushed stone per hour. In Montana during the 1958 season a highway contractor, Albert Lalonde Company of Sydney, Montana, got this production of processed gravel with a simple outfit.

This pace was maintained on $\frac{3}{4}$ in. material required to be 35 percent crushed. The job located near the town of Wolf Point, in Montana, required $1\frac{1}{2}$ -in. material, as well as smaller sizes, meeting the following gradation requirements:

For the base course:

1 $\frac{1}{2}$ -in. minus	100%
No. 4 sieve	25% to 60%
No. 200 sieve	less than 15%

For type A top course:

$\frac{3}{4}$ -in. sieve	100%
No. 4 sieve	42% to 70%
No. 10 sieve	25% to 50%
No. 200 sieve	2% to 10%
Dust ratio less than	60%
Minus 4/10, at least	8%

For cover material:

$\frac{3}{4}$ -in. sieve	100%
No. 4 sieve	9% to 50%
No. 10 sieve	0% to 8%
No. 200 sieve	0% to 2%

The firm's equipment for this stand consisted simply of a 1236 twin jaw Cedarapids Challenger portable plant with a 36" x 50' LF feed conveyor and new type swivel feed, 36-in. reciprocating feeder, hopper and grizzly. A second port-

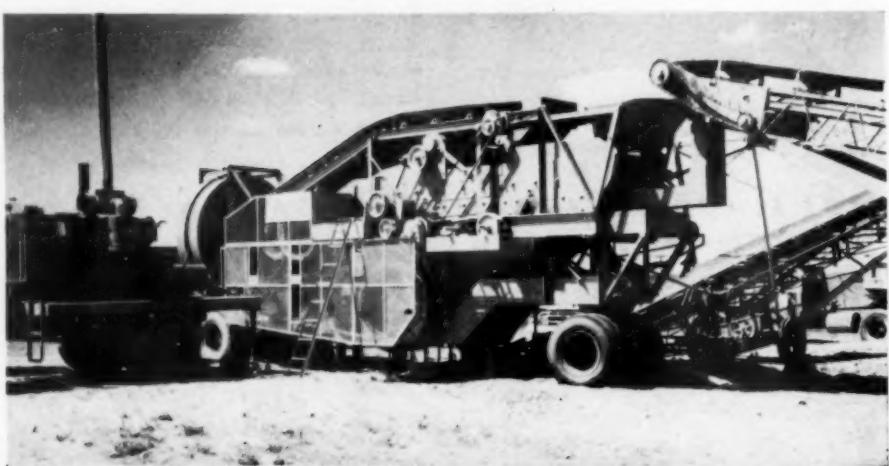
able conveyor unit dropped finished material into the trucks.

The crushing plant unit included a Cedarapids horizontal vibrating screen, which was so adjusted that carry-over was a minor problem. This screen's design facilitated moving the plant easily and with no extra-heavy blocking during the next setup.

On an adjoining contract, this firm crushed with Cedarapids units consisting of an intermediate crushing and screening plant with 18 x 36 twin jaw crusher. This unit produced 400 TPH of 3-in. material. A 30 x 25 roll crusher secondary plant at the same site reduced the 3-in. feed down to $\frac{3}{4}$ in. from stockpile at a 200 TPH rate.

The two contracts represented the largest Interstate highway job in progress in Montana during the 1958 season.

- The twin jaw and other features reportedly stepped up production for this Montana contractor, 40 to 100 percent over par for single jaw equipment.



ILLINOIS EXPANDS ITS EDGE STRIPING

New equipment handles big daily mileages of edge stripe, reduces traffic delays.

With a late season assist from new equipment, District One of the Illinois Division of Highways last year added to the state's experience in placing pavement edge striping in traffic.

District One, headquartered in Elgin just west of Chicago, comprises the heavily traveled arterial routes fringing the city. This district in 1955 initiated the state's edge striping, being assigned to test the idea and submit an evaluation. When this and a subsequent state-wide experiment proved favorable, and also showed acceptance by the public, all ten Illinois highway districts were ordered to set up expanded programs. These will be completed in 1959.

The Division specifies that edge lines be applied on all curves of less than 3,000-ft. radius, at all narrow bridges, at certain pavement transitions, winding road sections, and at any other locations designated by the district engineers. The

lines extend 500 ft. in either direction beyond these conditions.

The reflectorized lines are 4 in. wide and are applied with standard Illinois marking paint. During 1958, the District placed 400 miles of striping on busy arterials. The equipment used was a self-propelled machine designed by M-B Corporation specifically for edge striping and built to state of Illinois specifications. The striping equipment, mounted on the bed of a Ford truck, consisted of an air compressor, 250-gal. paint tank, 7-cu.-ft. bead tank, 5-gal. cleaner tank, application assembly, control panel, inter-com system, plus filter, air lines, piping and other parts. A detachable and collapsible 12-ft. wheel-mounted guide extends ahead of the front bumper.

A feature of the machine is the extendable boom for mounting the paint gun and bead dispenser. The boom can be extended to operate up to 6 ft., from the truck bed. The striping unit also can be used to paint a solid centerline by attaching a separate trailer assembly to the left rear of the striping unit, as has been done with the Elgin district's machine.

• Side view of the M-B striping unit used in the Elgin district; and the unit in action with pick-up trailing (both units carrying rear traffic signs).



• Retractable arm can be quickly adjusted laterally by means of boom operator's steering wheel for striping the edge at any offset from the centerline.

About 20 gal. of paint per mile of traffic line was used. In putting down 12 to 13 miles of line, the crew used one tankful of paint. Four pounds of Flex-o-lite beads are used per gallon. The guns are capable of striping up to 15 mph but District One operated the truck generally at 10-12 mph. From one to two tankfuls of paint were applied per day.

Five men made up the edge-striping crew. The truck carried a driver, a gun operator and a flagman who also put beads into the bead hopper. Safety measures were the concern of two men who followed the machine in a pick-up truck; they placed warning signs, also used the pick-up, equipped with its own large "caution" signs, to follow behind the striping unit on the highway when necessary.

The striping unit stocked up on paint and other supplies at a storage depot which the state maintains in every county. The paint was hauled by cargo truck to this point from a central storehouse at Elgin district headquarters.

(Continued on page 100)





*600 hp Michigan replaces tandem-pushers
on Hugh Steele Inc. highway job*

Earns \$126 extra

"Earning their keep?!! Why, in a year, I could run them into the middle of the Chattahoochee River, and still walk away with a profit!"

Hugh Steele is talking about three rubber-tired Michigan Dozers that are making their mark in big, bold dollar signs all around his 18.1 mile highway contract near Ashburn, Georgia.

Biggest profit producer is in the cut. It's a 600 hp Michigan Model 480! This big rig started out in demonstration against two 190-hp crawlers push-loading in tandem. The results were so one-sided Mr. Steele wouldn't let Atlanta distributor Stith Equipment Co.

take the Michigan off his job.

Scales, stop watch tell the story: 14 more loads per hour

With scales and stop watches, this production story was recorded:

Material	Model 480	Tandem Crawlers
Scraper capacity (each of 12 machines)	25 yds heaped (3000 lbs/yd)	25 yds heaped (3000 lbs/yd)
Average load time	30 seconds	44 seconds
Pusher cycle time	60 seconds	84 seconds
Average payload, scale weighed	60,000 lbs	48,600 lbs
Average pay yds	20.0	16.2
Scraper loads per 50-min hr.	50.0	35.7
Scraper output per 50-min hr.	1,000.0 yds	578.3 yds

In terms of cold cash, these figures mean simply that the Michigan *earns more dollars per hour*. A lot more! In 30c dirt, its *extra earnings* average \$126 per hour over tandem pushers, according to Mr. Steele.

Faster pushing nets bigger pay loads

Watch a few push-loading cycles and you'll see why. The Model 480 has half again as much power as the two crawler-pushers *combined*. It backs up faster than crawlers, and being one machine instead of two, naturally positions faster (24 seconds faster, on the



Biggest Michigan of all, this 600 hp Model 480, does more work than two big crawlers combined.



Steele's two 262 hp Model 280 Michigans spread and compact 20,000 yds of fill a day. In "spare" time, units also handle such scattered odd jobs as dressing stockpiles (below), towing disabled vehicles, backfilling around culverts.

per hour

average, on this job). It pushes faster (at speeds up to 5 mph), which both reduces load time and keeps the dirt more "alive." Result: higher, tighter, bigger loads—and more of them.

Other Michigans save time on fill-compaction assignment

Just as the big Model 480 is producing profits in the cut, so too are two other Michigan Dozers saving money for Owner Steele on the fill. These units are both 262 hp Model 280's. They are spreading fill and compacting it, achieving specified 95% Proctor in

two to three high-speed (7½ mph) passes.

Speed scattered odd jobs

And that's not all. Go-anywhere 28 mph mobility allows the Michigans to sneak away from main assignments to tackle emergency jobs. Towing disabled vehicles, for example. Back-filling around culverts. Building up low spots in haul roads.

These are just a few of the odd jobs. *But the real advantage of Michigan Dozers, Mr. Steele says, is their ability to outperform crawlers on many production*

jobs too. And do it day after day, with dependability equal to that of Michigan Tractor Shovels. There are four size Dozers to choose from: 162, 262, 375, and 600 hp. Your Michigan Distributor will be glad to show you one in action so you can judge its advantages for yourself.

Michigan is the registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division

2497 Pipestone Road
Benton Harbor 16, Michigan
In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

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From coast to coast, owners report



COLORADO

C. S. Jones, landscaping the new 17,800 acre Air Force Academy, reports his two Model 110 Michigan Scrapers have upped output 20% over other self-propelled pans in same price class. Main reasons: Michigan's greater capacity (10½ vs 9 to 9½ yds), easier loading (9 pay yds in 20 to 45 seconds).



CALIFORNIA

U. S. Borax & Chemical Corp, digging out largest known deposit of sodium borate in world, gets BIG production from team of 29 yd Model 310 Michigan Scraper and 600 hp Model 480 Michigan Dozer. Pay-loads weigh out at 26 yds—3 yds more than biggest track-type pushers could load previously.



WASHINGTON

Henry M. Johnson Excavating Co, Lewiston, Idaho, leveling for Washington State College's new science building, chose Michigan for "dependability." Scraper has all-Clark matched, designed and built power train . . . the same power train design used and proved in 10,000 Michigan Tractor Shovels.



TEXAS

T. R. Vardeman & Son Construction Co, digging lake for City of San Augustine, posts good production average with their Model 210 Michigan Scraper. On 2,400 ft cycles, 19-yd rig moves 15 loads per hour.



INDIANA

Leon Meshberger, working small scattered jobs throughout the Indianapolis-Columbus area, roads his Model 210 Michigan Scraper everywhere. Self-powered moves save loading, unloading delays and costs. Machine's top speed is over 30 mph.

"more work done" with Michigan Scrapers



KENTUCKY

Holloway & Sons Construction Co, building quarry-to-river dock access road, loads Model 110 Michigan Scrapers with small (85 hp) pusher, yet gets 8½ pay yds, scale-weighed, per trip. For added versatility, the 10½ yd pans interchange with 13 ton Rear Dumps. Scraper is also available in 4-wheel towed model.



FLORIDA

S. M. Wall Co, building a 10 mile, 120,000 yd cutoff around city of Archer, teamed two Model 210 Michigan Scrapers with a Model 280 Michigan Dozer: got 14 pay yd, 40 sec loading. Scrapers and pusher provided the efficiencies of *identical power trains*: matched speeds, easier maintenance, lower parts stocks.



NEW JERSEY

Sallcon Inc, forced by high labor costs to lay off men after each small job, then rehire for new contracts, solved critical training problem with Michigan Scrapers. Power-steered, power-shifted, torque converter Model 110's are "so easy to run," says owner, "new men become proficient after only a few cycles."

... for more details circle 297 on enclosed return postal card

ROADS AND STREETS, April, 1959



CONNECTICUT

Brancifort Bros, grading new shopping plaza, moved 1,400 yds per 9 hour day with their two Model 110 Michigan Scrapers. Note high apron lift; and good view operator has of well-controlled positive-ejection spread. Like all Michigans, unit is fully hydraulic; only cable is short length, yoke to apron.

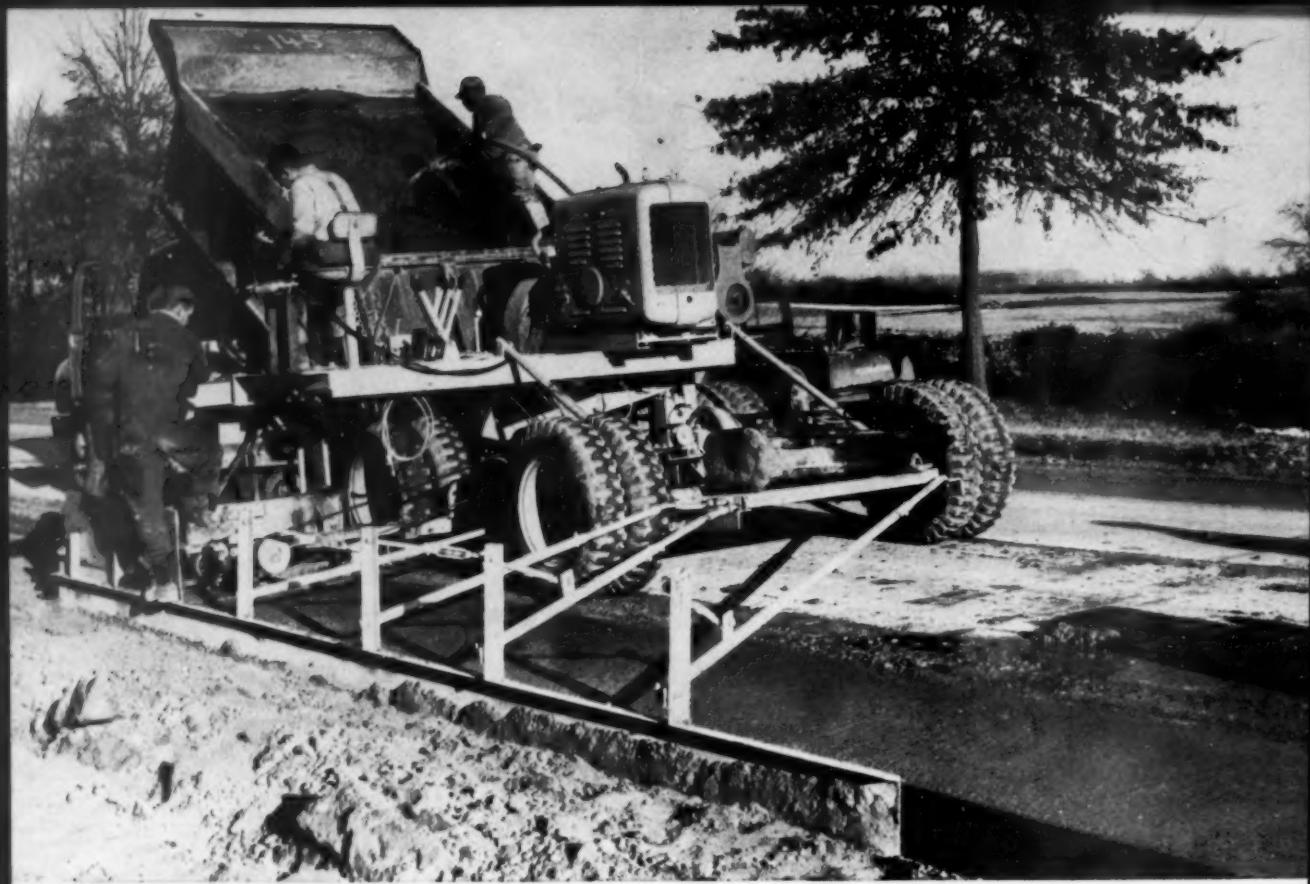


ONTARIO

George Schultz Construction Ltd, spreading base course, replaced a 10 yd and six 6-yd dump trucks with two 19-yd Michigans. Main advantage of the Scrapers: they hauled 18-yd payloads, unaided, through mud which continually stopped trucks. Also, they spread so accurately, contractor eliminated grader.



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CLARK EQUIPMENT COMPANY
Construction Machinery Division
2497 Piperton Road, Benton Harbor 17, Michigan
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario



Blaw-Knox slip form Widener at work on DuPont highway outside New Castle, Delaware. The contract, let by Delaware State Highway Department, calls for widening a $6\frac{1}{4}$ mile stretch of roadway from 20 to 24 feet. Bituminous Mix will be used for resurfacing.

Blaw-Knox slip form Road Widener places 72 yards of low slump concrete per hour on Delaware job

New slip form attachment eliminates setting of forms

"This Blaw-Knox Road Widener made it possible for our 14-man crew to complete this project in seven days. Without it we would have used the conventional method of widening—the setting of forms—which would have greatly increased the man-hour requirements. As it was, we finished the $6\frac{1}{4}$ mile stretch in seven days," says Webb Blevins, Job Superintendent, Wilson Contracting Company, New Castle, Delaware.

Plenty of power was demonstrated when the Blaw-Knox Road Widener pushed a 16-ton load up a considerable grade with "absolutely no loss of

speed," Mr. Blevins adds. "Using the Blaw-Knox Road Widener, we placed 15 feet of 4 feet wide—8 inch thick concrete every minute."

Engineered Blaw-Knox equipment such as the Road Widener, built for heavy duty performance is helping contractors everywhere to slash costs and build profits on construction jobs. Your Blaw-Knox distributor can give you all the details on the Model 95 Widener. If you would like a technical report on Wilson Contracting's experience, ask your Blaw-Knox distributor for a copy, or write the factory. No obligation of course.



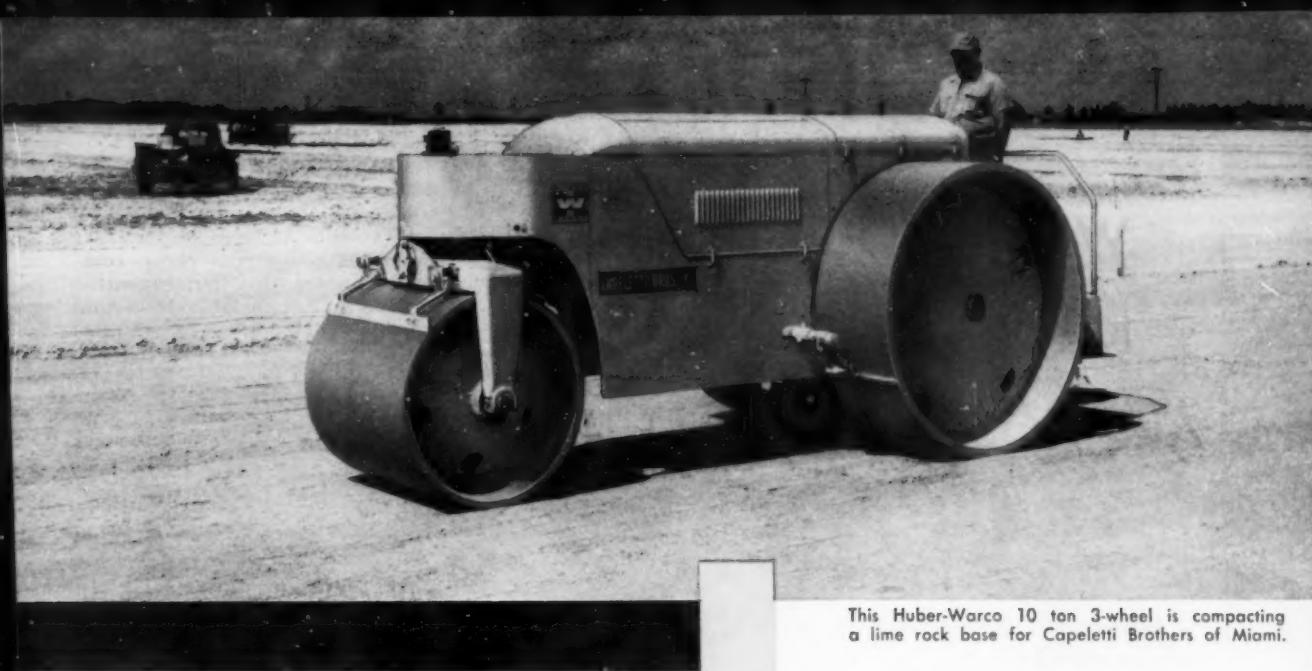
BLAW-KNOX COMPANY

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Construction Equipment

300 Sixth Avenue

Pittsburgh 22, Pennsylvania



This Huber-Warco 10 ton 3-wheel is compacting a lime rock base for Capeletti Brothers of Miami.

H-W 3-wheel at work for Florida contractor

When called on to handle the rolling operations in a Hialeah, Florida, subdivision, Capeletti Brothers Inc., a Miami paving contractor, put their three Huber-Warco 3-wheel rollers on the job.

This subdivision, developed by the Palm Springs Development Corporation, included approximately 2000 homes and a new school. Capeletti handled the contract for the streets and roads in the project, as well as the construction of a 100' x 200' parking lot at the new school.

A typical comment about the performance of the Huber-Warco 3-wheel was voiced by Frank Worrall, the supervisor for Capeletti on this project. He stated, "The torque converter in this machine permits us to do better work with less effort." Mr. Worrall continued, "Efficiency is increased even at slow rolling speeds."

The combination of a torque converter and 2-speed transmission in the Huber-Warco 3-wheel means more economical operation, longer parts life and fast steering at all speeds.

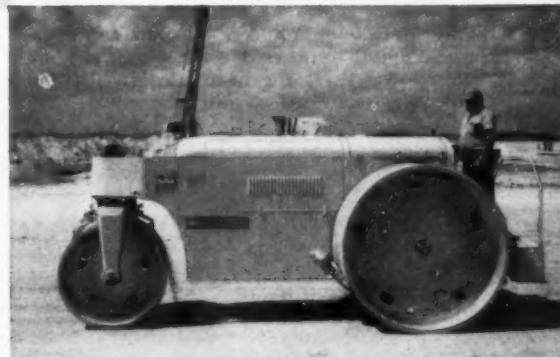
Your Huber-Warco distributor will be glad to give you complete specifications for the standard and variable weight models in the 3-wheel roller line. He can arrange terms up to 36 months for you on the purchase of a new machine, and can provide you with a rental unit.

Huber-Warco on the job

Better work with less effort.

Increased efficiency even at slow rolling speeds.

On the new school parking lot, this Huber-Warco 3-wheel compacts the finish course.



Huber-Warco Company

MARION, OHIO

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WHAT YOU SHOULD KNOW ABOUT PIPES AIR HOSES AND FITTINGS

Couplings should be selected carefully for the specific service intended.

Ordinary handling care can increase hose and coupling service life even beyond the amazing durability designed into them.

By J. E. McGrogan

Central Regional Sales Manager, Schramm, Inc., West Chester, Pa.

PIPING, air hose and fittings are key links in safe, efficient operation of pneumatic rock drill equipment on rock and earth removal jobs.

Selection of the proper type of drilling rig is important (see Roads and Streets staff report on subject, July, 1958 issue). But a poorly fitted coupling can impair the efficiency of the best drill rig.

Air-line couplings provide a quick and safe way of connecting a pneumatic tool to a source of compressed air. Two types, the quick-detachable and universal, are in general use. Both are designed so the coupling cannot be disconnected with air in the hose. This is an important safety factor when working at close quarters or on a scaffold.

A coupling must provide direct passage for air flow and keep pressure drop to a minimum. Couplings with restrictions should be avoided: At 90 psi pressure, every pound of pressure drop across a coupling reduces the tool's work output by 1 percent. A series of couplings with a combined pressure drop of 10 psi would mean a loss in power of 10

Schramm, Inc., is a member company of Compressed Air & Gas Institute.

to 15 percent on a tool set to operate at 90 psi.

Couplings must also prevent air leaks. These can be caused by failure to replace coupling gaskets often enough. At 7¢ to 9¢ per 1,000 cu. ft./min. air is a cheap commodity when used, but expensive when wasted. This table shows how much air can be lost through leaky couplings:

Size	Orifice (leak)	cf lost*
	$\frac{1}{32}''$	45,500 cu. ft.
	$\frac{1}{16}''$	182,000 "
	$\frac{1}{8}''$	740,200 "
	$\frac{1}{4}''$	2,920,000 "
	$\frac{3}{8}''$	6,671,900 "

*Less per working month @ 100 pounds psig.

Hose and couplings are integral parts of one service unit. The manner in which each works with the other determines the satisfaction both, as a unit, will give.

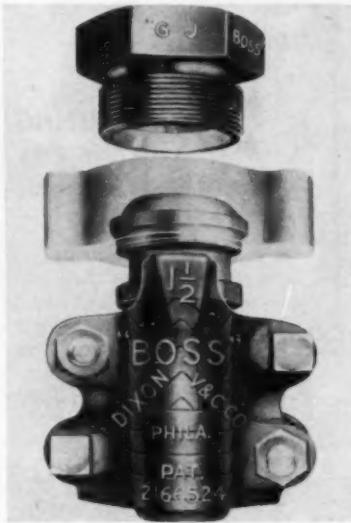
● Where Wear Begins.

The critical part of any hose is its end. Here the hose not only is subjected to severe twists and sharp radius bends off fixed outlets, but also must carry most of the weight and pressure. Hose ends always show wear first, even under the most favorable conditions.

● Fig. 1—Rotary drill supplying materials for nearby highway project. This is a complete drilling unit, including air compressor, with all hoses and couplings pre-engineered by the manufacturer. Note "up-wind" position of drill rig and chips from "blooie line" blowing away from working positions of drill rig and shovels.



Familiar Coupling Types—Use Right Names In Ordering



• Fig. 2—Male or "spud" end of heavy-duty hose coupling usually used for larger diameter hoses, from 1½ in. up.



• Fig. 3—Male and female ends of the "quick-detachable" type couplings. Usually used on sizes of air hose up to 1 in. diameter.



• Fig. 4—Hose ends of the "quick-detachable" air hose couplings. Note cotter pin flared for safety.

The threaded portion of a coupling is specially susceptible to damage through rough or careless treatment. It should be protected. Wherever possible, hose should be coiled or reeled before moving. Dragging is dangerous to the hose, and doubly so to couplings, which are larger and more vulnerable to impact with rocks and other obstructions.

Hose should never be twisted—nothing can break down hose construction more quickly. This problem can be met by having at least one coupling of the swivel type, so movement can be made in the coupling alone.

When a leak develops, examine the fit of the clamp before condemning the hose or coupling. Rubber "flows" under pressure, and the clamp may need occasional tightening to keep a good connection.

Couplings have to be more than efficient. They must be safe, under any circumstances. No matter what type is being used, they must be proof against all danger of blowing

off, coming apart at connections or pulling apart from excess drag.

Safety factors should be given special consideration in such severe types of services as highway con-

struction. The clamping device should securely anchor coupling to nipple by an approved method. In threaded connections, material should be resistant to wear and vi-

TABLE I
PIPE SIZE RECOMMENDATIONS FOR TRANSMISSION OF
COMPRESSED AIR AT 80-125 p.s.i.g.

VOLUME OF AIR TRANSMITTED C.F.M.	Length of Run in Feet				
	Nominal Pipe Diameter in Inches				
	50-200	200-500	500-1000	1000-2500	2500-5000
30 - 60	1	1	1½	1½	1½
60 - 100	1	1½	1½	2	—
100 - 200	1½	1½	2	2½	2½
200 - 500	2	2½	3	3½	3½
500 - 1000	2½	3	3½	4	4½
1000 - 2000	2½	4	4½	5	5
2000 - 4000	3½	5	6	8	8
4000 - 8000	6	8	8	10	10

HOSE SIZE RECOMMENDATIONS FOR TRANSMISSION
OF COMPRESSED AIR AT 80 TO 125 Psig.

100 - 200	Winches & Hoists Drifters Wagon Drills Rock Drills - large	1	1	1
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• Fig. 5—Three-way "quick-detachable" coupling, used on multiple tool hook-ups.



• Fig. 6—Blank end of "quick-detachable" coupling, shown here, has multi-purpose use.

bration and not strip off in service. A worn thread causing a loose connection is a warning of danger ahead. It is far better to throw away the coupling than risk serious injury.

Many operators have incorrect ideas about how hose couplings should be attached. These are important procedures to remember:

1. Lubricate coupling shank and inside of hose end with rubber cement or soapy water. Don't use oil or grease—it may damage tube stock.

2. Do not bind hose in a vise and attempt to insert coupling. Hold the coupling in the vise and put the hose over coupling.

3. When attaching clamps of the spud or quick-detachable types, be sure the extended clamp fingers properly engage coupling stem collar.

4. Never heat a hose nipple and insert by "burning in." It ruins the hose tube at the point where a strong, full tube stock is essential.

5. On heavy-walled hose, allow couplings to set for a short period after original application, then pull up on bolts again before placing hose in service. This compensates for rubber "flow" under clamping area.

6. Never insert a coupling, nipple or shank into a hose unless the end is rounded so it cannot cut or puncture the hose tube.

7. A carelessly applied coupling, or one not adequate for the job, can cause injury. Be sure hose is securely linked with the proper couplings before it is put in service.

• Ordering Couplings.

Do not order hose couplings by "sets" or "pairs." A "set" can mean

either two male or two female couplings, or one male and one female, depending on type of service. One length of hose requires two couplings. Avoid errors by specifying the number of male and female couplings desired, along with part or style number if available.

Proper size hose, pipe and fittings must be used to assure adequate volume and pressure, and to prevent air restriction (see Table 1).

Types used must permit convenient checking and inspection for leaks and tightening. Correct types of sizes of wrenches should be available for servicing. To prevent expensive down-time, a reserve supply of hose, pipe and fittings should be available for emergencies.

Piping should be as direct as possible, with long-radius elbows where bends are necessary. It should be full diameter, and if "long runs" are necessary the next larger diameter pipe should be used.

Drain valves or plugs should be installed to provide for cleaning and blowing out collected moisture. Discharge pipe should be the same size or larger than the compressor outlet. Pipe sizes should be consistent: Never install a small diameter pipe in a line between two pipes of larger diameter.

Most air-operated construction tools have an oil reservoir which should be filled once or twice a day with light oil, according to manufacturer's instructions. To assure adequate lubrication on all air tools, an air line lubricator (line oiler) is recommended. This should be coupled in the air line as close to the tool as practicable.

Perhaps the most important rule

of all to follow is for contractors to utilize the experience of air hose and compressor suppliers in setting up their rigs. This almost always improves safety conditions, gives better tool performance, and minimizes delays, resulting in considerable operational savings.

EDGE STRIPING

(Continued from page 91)

Problems met by District One in its edge striping:

• The new markings, of course, will not last as long as they will in subsequent years when resistance to wear has been built up by repeated applications of paint on paint. Wear also is a factor with edge lines on narrower highways, where the line is crossed or ridden on continually by truck traffic.

• All traffic must pass to the left, whereas, in centerline work, it can pass on both sides. Also with the machine traveling on or just adjacent to the center line for guide purposes, traffic must be sufficiently forewarned of the close quarters and of the need for careful driving.

• The boom must be adjustable to be able to adapt to pavement width variations and to road edge conditions.

• Police are needed at times on roads where sight distance is poor. In these conditions, however, two factors act to minimize traffic inconveniences: (1) the nature of the program, which specifies edge striping only at those locations referred to above; (2) the speed with which the work can be done with modern equipment.

R. R. Bartelsmeyer is chief highway engineer for the state of Illinois, H. H. Harrison is engineer of traffic for the state; D. S. Magowan is district engineer for District One; Fred Mason is district traffic engineer and Gordon Graham is field engineer in charge of signs and pavement markings.

APPOINTMENT OF SHELLEY P. JONES as manager of truck tire sales for The General Tire & Rubber Company's Chicago division has been announced by L. L. Higbee, trade sales manager.

**FOR BIG VOLUME
SECONDARY CRUSHING
of hard, abrasive materials**



Want lowest cost per ton?

buy

Cedarapids

Built by
IOWA

Cedarapids
IOWA MANUFACTURING COMPANY, Cedar Rapids, U.S.A.

Cedarapids Cone Crusher Intermediate Plant, fed by a 42" x 30' Cedarapids Ground Level Feeder, produces 200 tons per hour of 2" and down glacial gravel for Ohio Gravel Company, Cincinnati, Ohio.

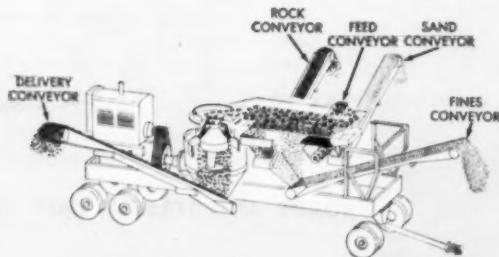
**You get uniform fine-crushed products with Cedarapids
CONE CRUSHER INTERMEDIATE PLANTS**

Look at all you can do in hard, abrasive materials with this Cedarapids-engineered portable plant consisting of a Cedarapids 4' x 12' double deck horizontal vibrating screen and a 4' Symons® Cone Crusher, with conveyors for handling up to four different products.

Sand and fines can be scalped off, while another specified size (determined by screen opening) is taken off by the second deck. Oversize from the top deck is reduced by the Cone Crusher to desired size. Finished products are finely crushed and fairly uniform in size . . .

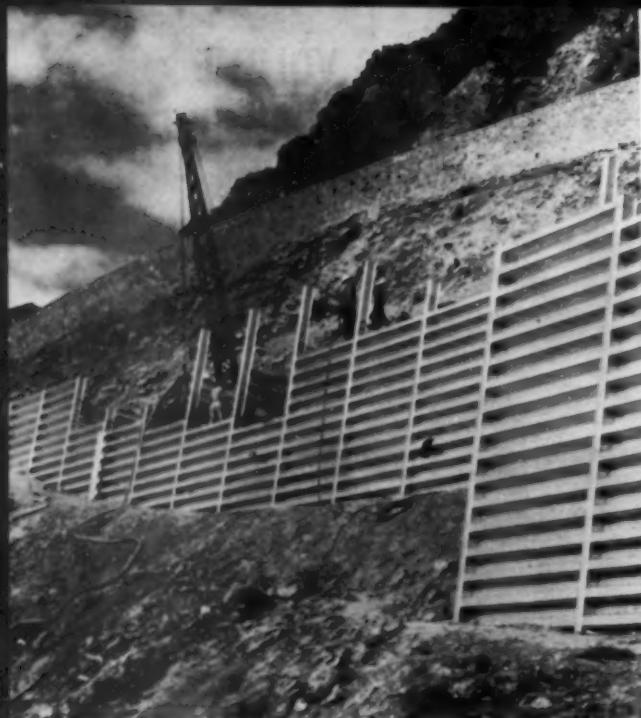
the kind required in so many specifications. Cedarapids Cone Crusher Intermediate Plants are unexcelled for secondary reduction in quarries when used after a Cedarapids Portable Primary, or for primary crushing in gravel operations. Your nearby Cedarapids Dealer will gladly show you how this unit can help you upgrade your products . . . and profits. Ask about other Cedarapids Intermediate plants with twin-jaw and roll crushers, and the many other types of Cedarapids portable and stationary aggregate producing units.

IOWA MANUFACTURING COMPANY, Cedar Rapids, Iowa, U.S.A.



. . . for more details circle 334 on enclosed return postal card

Flow diagram shows Cedarapids Model 4-ICS Cone Crusher Intermediate Plant set up to produce four finished products. Only oversize material passes through crusher, assuring big volume production. The Symons Cone will reduce 7 1/2" material to 3/4" in one pass. Screen cloth and crusher settings are easily and quickly changed for producing a wide variety of product sizes.



Bin-Type Retaining

Walls Provide

ELBOW ROOM FOR FOUR-LANING JOB

- Retaining wall permitted a wider highway right-of-way, closer to the railroad tracks below. Existing 2-lane road and stone masonry retaining wall (above) were to be removed when first lane of new highway was graded.

Improvement project on U.S. 40 in Nevada required 920 lineal feet of metal wall. An example of effective wall utilization, with notes on some of the structural details and installation procedures.

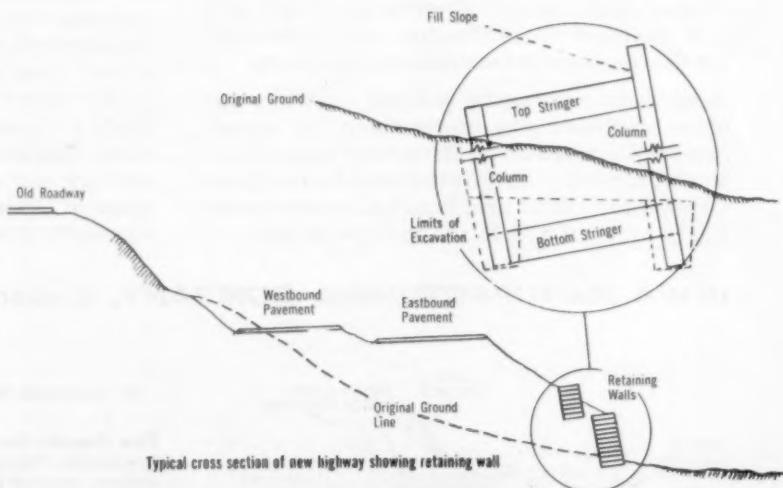
Heavily traveled U. S. 40 east of Reno, Nevada, was rebuilt not long ago as a 4-lane divided highway for nearly 20 miles. But at a point eight miles east of Sparks, Nevada, the highway converged into a natural bottleneck that narrowed the pavement to only two lanes. A steep, rocky cliff to the north formed one side of the bottleneck. To the south is the Truckee River with a railroad line between the river and the highway. The highway threaded along the steep face of the hill. With slopes as steep as 45 degrees, parts of the right-of-way were cut out of the hillside to accommodate even two lanes.

Then in 1957, as Nevada's first Interstate project, work was started to bring this section up to mountain expressway standards. The big problem was to provide enough extra level space to accommodate four lanes. This required at least 96 ft., including two 24-ft. pavements, a 20-ft. median strip, 10-ft. outside

shoulders, and 4-ft. inside shoulders.

Armco bin-type retaining walls

were installed on the down-hill slope, roughly paralleling the designed center line. These walls were assembled in place from prefabricated steel parts. Approximately 14,000 sq. ft. of retaining wall was required to provide an adequate right-of-way along this hill. The bins vary in base width from 5.5 ft. to 14.3 ft. A total of 92 bins, each 10 ft. long, made up the approximately 920 lin. ft. of wall.



- Typical cross-section of new highway showing retaining wall.



• (Left): Retaining walls were varied to meet changes in grade by changing the height of the Armco bin-type design in 16-in. multiples. Both top and bottom of the wall were varied as required. (Right): Narrow area between river (left) and hillside (right) required maximum use of available roadway space.

The natural ground slope, ranging up to 45 degrees, required various heights of retaining wall from 5'4" to 25'4". When concave or convex curves were required, a shorter 9'6" stringer was used either in the front face or the back face of the wall.

Extra 16-in. stringers were installed on the top of the wall as a rock fence to keep slides and debris off the railroad tracks below.

A level space was excavated out of the slope of the hill. Trenches were dug for the column base plates, bottom stringers and spacers, leaving the original soil intact in the center of each bin.

Foundations under the column base plates were cleared of debris, sod, and unstable soil. Rocks were removed and backfilled with soil to provide a cushion for the wall to adjust to small differential settlements. The wall was placed on a 1:6 batter, with the front toed-in 2'8" to resist sliding.

Granular backfill was placed inside the bins in 6- to 10-in. lifts and thoroughly tamped to assure necessary weight of fill in the wall and to prevent later settlement. To prevent unequal soil pressures, the backfill behind the wall was kept at approximately the same level as inside the wall. After the backfill reached the top of the bins, fill for the highway base was put on top.

Army Engineers Test Welded Aluminum Bridge

The U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia, are currently conducting structural tests on four full-size experimental all-welded aluminum truss panels for a military tactical bridge.

Believed to be the first of their kind in the United States, these panels have been fabricated by Aluminum Company of America from one of the new non-heat-treatable, weldable aluminum alloys.

It is anticipated that the truss components will support a 60-ton tank load on a 90-ft. span. In order to obtain this capacity in the

past, when high strength, heat-treatable aluminum alloys were used, it was necessary to build-up panel members by neutral axis welding. The panel components were then joined by riveting or bolting.

The trusses are divided into 920-lb. portable panels. Members were fabricated from aluminum alloy 5456-H321 plate stock, ultimate tensile strength 52,000 psi. The upper and lower chords are box sections, and the diagonal and vertical members are built-up wide flange sections. Welding was by the inert gas-shielded metal arc method using consumable electrode.

- New experimental aluminum truss, consisting of portable field-riveted panels.



Can you imagine a more to load...unload



Construction equipment gets bigger, harder to load and certainly more costly. So what better reasons are there to choose the fast, safe and simple front-end loading and unloading provided by LACROSSE Removable Gooseneck Trailers.

First, consider LACROSSE Removable Gooseneck design: both ends of the gooseneck have standard kingpin and fifth wheel hook-up . . . fool-proof, positive locking so familiar to everyone. This design —without the use of winch, power or hydraulic attachments—permits loading and unloading to be

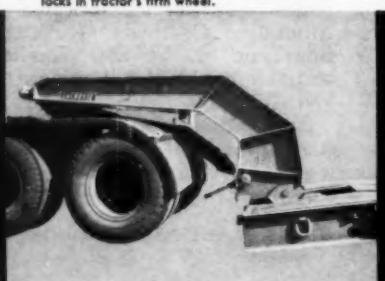
accomplished in the three safe and simple steps illustrated below.

Important, too, running gear and brakes on these Removable Gooseneck Trailers are LACROSSE designed, engineered and manufactured . . . your assurance of generous overload strength and support. Units available with capacities of from 25 to 75 tons payload. Options of flat deck, drop side deck or beam deck design. Two and three axle models. Get the full facts from your LACROSSE Dealer or write for the brand new brochure No. RG-2560.

① Release tractor kingpin connection and pull away; trailer gently lowers to the ground.



② Swing hinged stirrups on gooseneck to up position and back up tractor till upper kingpin locks in tractor's fifth wheel.



③ Release lower kingpin from trailer fifth wheel and tractor pulls away with gooseneck. As simple as 1-2-3!

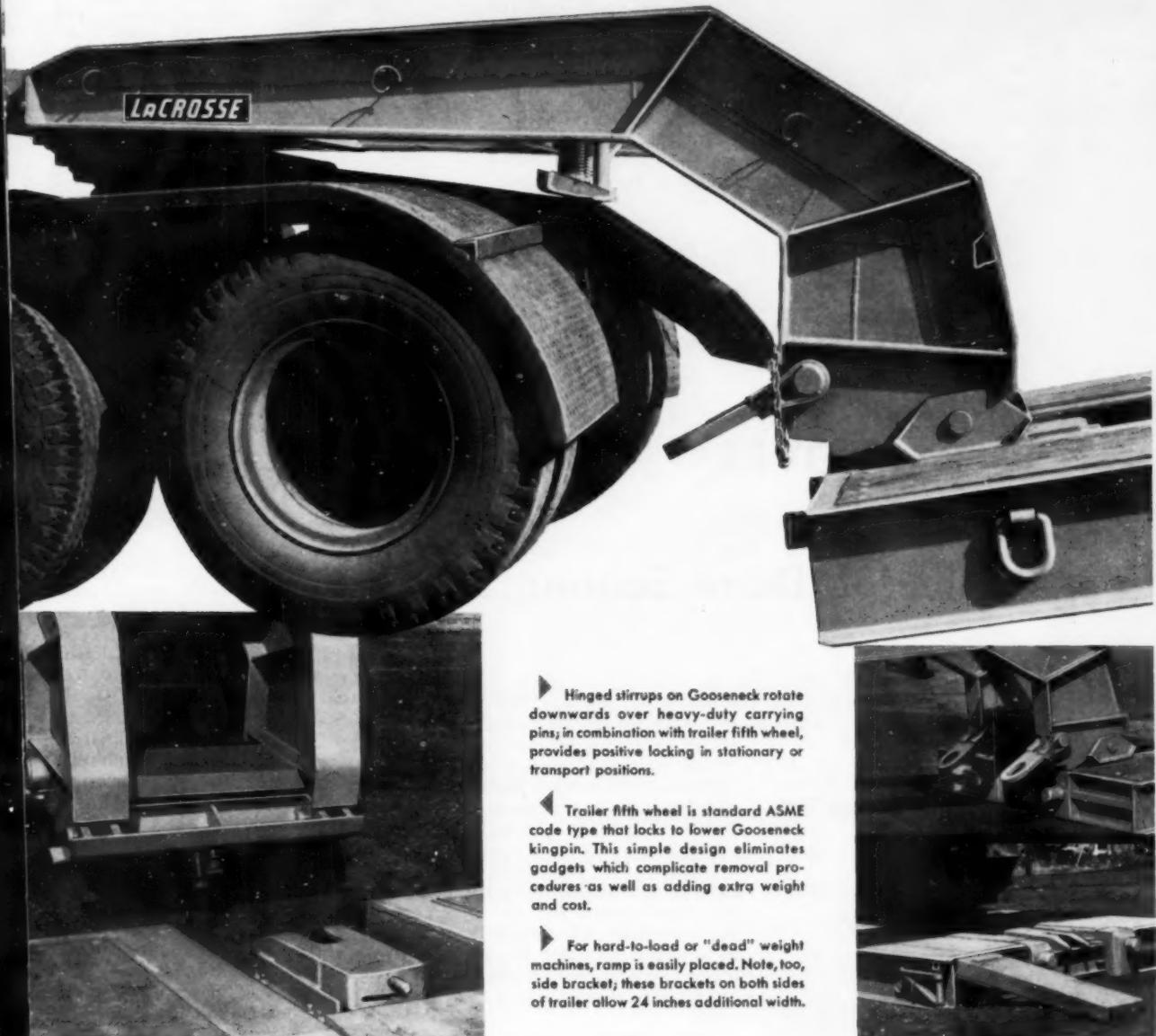


LACROSSE

TRAILER CORPORATION

418 GOULD STREET • LACROSSE, WISCONSIN

Safe and Simple way and transport?



► Hinged stirrups on Gooseneck rotate downwards over heavy-duty carrying pins; in combination with trailer fifth wheel, provides positive locking in stationary or transport positions.

◀ Trailer fifth wheel is standard ASME code type that locks to lower Gooseneck kingpin. This simple design eliminates gadgets which complicate removal procedures as well as adding extra weight and cost.

► For hard-to-load or "dead" weight machines, ramp is easily placed. Note, too, side bracket; these brackets on both sides of trailer allow 24 inches additional width.

OTHER LACROSSE TRAILERS



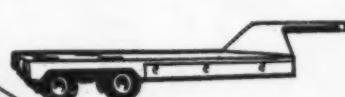
8-10 TONS



8-15 TONS



13-20 TONS



20-40 TONS

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ROADS AND STREETS, April, 1959



• Rushing O'Hare Field jet runway to completion before winter weather, the contractor had to lay concrete strips next to previously-laid concrete (foreground) as soon as possible.

• Field tank being replenished with WRDA additive delivered by tank truck, a method adopted recently by several distributors of Dewey and Almy's admixtures. It eliminates handling of drums.

QUICKER LANE MOVES

Airfield Job Done Sooner

Coming of jet planes into Chicago's O'Hare International Airport was made possible this past winter by speedy runway job.

The contracting firm of CK Associates, Evanston, Illinois—following its big push on the Illinois Toll

way—switched equipment to the airfield late in the season and finished without need for winter carry-over. In the process it capitalized an effective method of placing adjacent strips of concrete in the shortest possible time: incorporation of a water reducing agent to get high early strengths.

Required to place over 40,000 cu. yd. of concrete between mid-September award and the December 15 deadline, CK Associates faced its toughest problem in the four broad "hold aprons" at the end of two taxiways. Each apron is 13 strips wide.

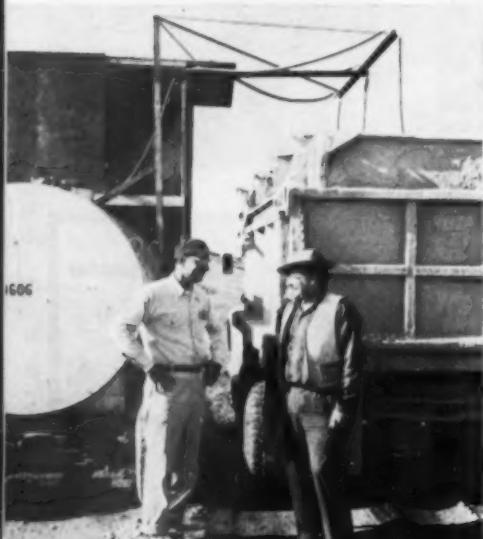
Laying alternate strips would have

been difficult with available equipment. On the other hand, each strip had to cure long enough to support heavy finishing machines as the adjoining strip was laid down. Standard concrete would have required delay during curing.

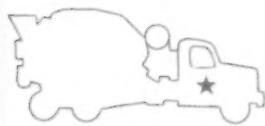
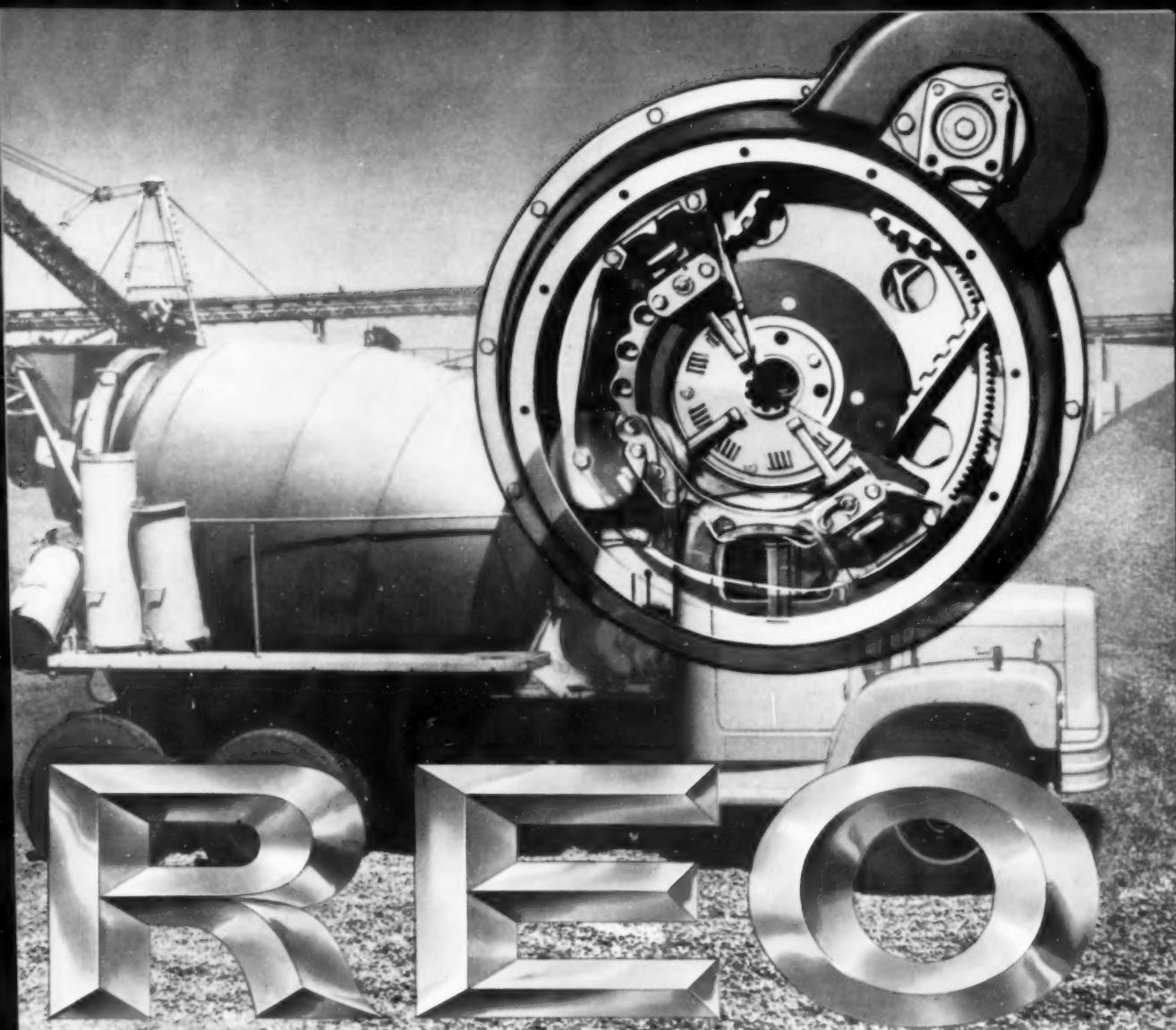
CK Associates used a water reducing agent, an admixture ordinarily employed simply to secure high ultimate strength. The agent selected was WRDA (by Dewey and Almy). Concrete with WRDA develops higher strengths at all ages because the admixture lessens the interparticle attraction of the cement, thereby reducing the amount of water needed to lubricate the mix, and increasing the strength proportionately. As a result, CK Associates were able to roll their equipment on the new concrete sooner.

The new runway was 8,860 x 200 ft. laid partly over an existing asphalt runway. Surface area was 139,000 sq. yd.; depths varied from 9 to 15 in.

Architect for the project was Naess and Murphy of Chicago. The firm of CK Associates is composed of Contracting and Materials Co., Evanston; Kenny Construction Co., Skokie; and Pierson Construction Co., Saginaw, Mich.



• Trucks on way to paver with cement and aggregates, halt momentarily at WRDA dispenser, receive precisely controlled amount of liquid admixture through hoses. Dave Stein, left, paving superintendent with CK Associates, and John S. Hamilton, of E. W. Zimmerman Co., WRDA distributor.



Reo's revolutionary new Flywheel P.T.O. brings to transit mix operators a "bonus" payload increase from 400 to 600 lbs. per trip—actual weight savings in a 6½ cu. yd. mixer unit resulting from the elimination of separate engine power.

Also eliminated are the headaches of separate service and maintenance requirements.

Reo engineered and installed as an integral part of the chassis engine drive, the Reo Flywheel P.T.O. supplies the mixer with a lighter and more efficient new source of power—smooth . . . even flowing . . . direct.

Most important, operators can have the "bonus" payload advantage of Reo's new P.T.O. at a low initial cost of equipment.

Now available in Reo's rugged "C" Series line of transit-mix trucks. Another product of Reo's creative engineering skill has been added to the many important values found only in Reo Trucks. Reo Division, The White Motor Company, Lansing, Michigan.



Gold Standard of Values



Clyde Everett Equipment Company, Burlington, Mass.

Sells, Rents, and Services 'em using Cities Service Lubricants!

With 30 mechanics to service equipment wherever it stands, Clyde Everett Equipment Company is one of the largest New England sales-rental-service firms in the construction field.

Clearly, it is no coincidence that Clyde Everett entrusts the lubrication of all of its millions of dollars worth of equipment to Cities Service lubricants.

For example, Cities Service C-300 is their choice in motor oil because it gives the kind of superior protection against sludge, carbon and varnish that extends periods between overhaul and pleases their customers with trouble-free performance.

Likewise, in the cold New England weather, Cities Service North Star No. 2 is the perfect lubricant for Clyde Everett's compressors...has exceptional oxidation resistance plus the perfect viscosity and pour point for low temperature operation.

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108



Service Mgr. Hollis Stiles:
To him, good service and
top quality products means
Cities Service.



Valued well in the millions,
Clyde Everett's equipment
is exclusively lubricated by
Cities Service.

"People who try to achieve good maintenance without using top-grade lubricants forget that a chain is only as strong as its weakest link," says Service Manager Hollis Stiles. "Our policy is to keep the lubrication link as strong as the others in the job of servicing—and we've found we can rely on Cities Service to meet this goal."

Like Mr. Stiles, you'll find you can rely on Cities Service to help you meet or even exceed your maintenance goals. Get the full story from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES  SERVICE
QUALITY PETROLEUM PRODUCTS

ROADS AND STREETS, April, 1959

"P&H" Looks Back on 75 Years of Crane Shovel Progress

A famous construction industry trademark will be 75 years old this year. And Harnischfeger Corporation, "P&H," is marking the event by recalling achievements and announcing new plans and products.

Going into its 75th year, Harnischfeger tallies up the following production record:

Nearly 25,000 overhead traveling cranes, including the "Magnetorque" cranes which Harnischfeger pioneered, and electronic "stepless" controls. Almost every P&H crane produced is still operating, the company says.

Over 81,000 electric wire-rope hoists.

Some 20,000 power cranes (10 to 100 tons capacity) and shovels (1/2 to 10-yd. capacity).

About 85,000 welding machines, plus 600,000,000 pounds of electrodes.

8,000 diesel engines and 17,500 prefabricated home units.

Entry into the soil stabilizer and loader markets.

Following a 1958 business of almost \$69,000,000 drawn from five continents, President Walter Harnischfeger says that concerted action is planned for 1959 to improve the company's position and meet the competitive challenge. To this end, the company has plans for new products or product improvements in virtually all of its major divisions.

Four or five new excavator models are being introduced at this time. A new line of truck cranes is under development, and new electric hoists ranging in capacity from 250 lb. to 5 tons are scheduled for the near future.

Announcement will soon be made of the addition of new V-type loop scavenger models to the company's diesel engine line. Still to be introduced in 1959 is the other half of the new line of DC rotary welders, first models of which were launched in 1958. And two new models added to the array of Harnischfeger Homes are just reaching the market.

Although sales declined somewhat from the all-time peak of \$87,500,000 in 1957, results achieved in fiscal 1958 still were the third best on record for Harnischfeger. During 1958 the company shipped its 1 billionth dollar of net sales. Tabulated for its entire history through October 31, 1958, "P&H" also showed a gross payroll of \$342,000,000 and a total of \$36,000,000 invested in plant, property and equipment, some \$25,000,000 of this between 1942 and the present. The company estimates that during its history its purchase of goods and services from suppliers has approximated \$600,000,000 in value.

Alonzo Pawling and Henry Harnischfeger started their business in a little machine and pattern shop in Milwaukee in 1884. Since then



• A P&H model 575 truck crane steadies a bridge girder.

the company has pioneered in development of digging and lifting machinery. An early "P&H" breakthrough, for example, was the first gasoline powered excavator ever built, a 1 1/4-yd. dragline. As a pioneer manufacturer of welding equipment, "P&H" helped to develop its great potential for heavy machinery. The shovel which introduced all-welded construction in 1934 was the Model 100, a 3/8-yd. unit.

In addition to three plants in Milwaukee, Harnischfeger has installations at Port Washington, Wis.; Escanaba, Mich.; Crystal Lake, Ill.; Los Angeles, Calif.; and Teterboro, N.J., plus warehouses in other principal cities. It has manufacturing affiliates in Germany, Canada, Japan, Brazil, Australia, Chile, and Mexico and corporation sales representatives in major cities throughout the world.

• The main Harnischfeger plant in Milwaukee, one of nine throughout the country.



Job Ideas



• The stump splitter and the International TD-24 tractor in action with this effective attachment.

Stump Splitting Tooth on Dozer Blade

Subcontractor Charles Peckham examines special stump-splitting tooth attached to the blade of his International TD-24, which is being used to clear a four-mile right-of-way for new Interstate Highway No. 91 near Brattleboro, Vt. Designed for fast, clean uprooting operations, the splitter is made from a dozer blade attachable tooth welded to a manganese steel wedge that measures 12 in. long, 1 in. wide and 3 in. deep.

The tractor was used to doze a path averaging 300 ft. in width, and for knock-down and stumping work. It was followed by an International TD-18 for piling and burning operations.

Gradall Arm Helps Roll Embankment Slope

Ingenuity in adapting the multi-purpose Warner & Swasey Gradall to meet an unusual on-the-job situation produced an immediate profit payoff for the McWhorter Crane Service of North Hollywood,

California. The problem was to effectively handle a job of compacting the steep slopes of a bridge approach at Long Beach, Calif. The solution was the use of a specially designed 1,500-lb. roller on a 6-ft. boom extension attached to the regular boom of a standard truck-mounted Gradall. The weight of the special roller in combination with the powerful down thrust of the Gradall boom enabled the operator to do a fast and effective job

• Long reach plus hydraulic down pressure helped make this rolling method effective.



of compacting this fill in spite of its steep slope.

The Gradall was positioned at the top of the embankment and the roller was run up and down the slope of the approach to the Ninth Street bridge in Long Beach.

Tips on Tightening in Diesel Maintenance

How much should a bolt, cap-screw or nut be tightened? Around the maintenance shop there are many definitions of tightness. It's quite common to hear such terms as "finger tight," "snugged," "seated" or "so many pounds-feet tight".

To tighten a bolt, according to advice from Caterpillar Tractor Co., the nut must be turned down until the bolt begins to stretch. Any degree of stretching is due to the tension from the torque applied to the nut as it is moved up the bolt's thread. Air cleaner wing nuts, for example, are considered "finger tight" when enough torque has been applied by the hand to hold the cleaner tray securely in place. A drain plug is considered "snugged" when it is tightened just enough to hold it in place and keep oil from leaking past the gasket. A fitting is "seated" when it is turned into position although not necessarily placed in tension. Each of these terms is relative and amply describes non-critical degrees of tightness.

Naturally, it's impractical to torque all bolts to close tolerances. According to the Service Department of Caterpillar Tractor Co. there are, however, many instances where exact amounts of torque must be applied. Service Department personnel point out that hydraulic pumps and valves, for ex-

ample, have small internal clearances. While it is desirable to have the parts of these units assembled tightly, too much tightening will reduce internal clearances to zero. Main and connecting rod bearings are round only when the correct torque is applied to the cap nuts. Too much torque will put these bearings out-of-round and cause failure of the parts when the engine is put back into service. Excessive tightening of cylinder head studs can distort the head, with a good probability of leakage, warping and cracking.

A torque wrench should be used to obtain a specific amount of torque when the amount of tightness is critical. If the torque is not measured it is easily possible to get an improper gasket crush from too little tightness, or cause distortion or bolt "set" from an excessive amount of torque. Additionally, the recommended tightening sequence should be followed.

The torque wrench will allow consistently accurate results every time. Like most tools, there is a correct way to use it. Torque should be brought up in increments by using a steady pull. Jerking the wrench will result in higher torques than are actually indicated on the wrench dial.

Reliable machine performance depends on correct adjustments. A torque wrench should be accurate and applied properly. The manufacturer's maintenance manual or dealer serviceman should be consulted for correct torque specifications.

• A torque wrench, as shown here, should always be used whenever exact amounts of torque are specified in tightening nuts. Always follow the manufacturer's maintenance instructions for torque requirements and tightening sequence, advises Caterpillar service people.



• E. N. Sonnier, center, Houston contractor, demonstrates his fanned-flame technique of land clearing to R. E. Hornberger, right, developer of Houston's San Jacinto industrial district, where the picture was made.

Big Fan Speeds Burning for Clearing

Blowing into the coals of his barbecue pit to get the fire started gave a Texas man a great idea, an idea that has reportedly meant thousands of dollars of revenue to his business.

E. N. Sonnier, a Houston earth-moving and road contractor, has applied the simple trick of fanning a fire, as an aid in clearing land for oil companies, industrial districts and highways.

He mounted a 5-ft. electric fan on a truck and installed a 50-gal. drum of diesel oil behind it, along

with a pump which squirts the oil 30 to 40 ft. into trees, trunks and brush which have been piled up. Waiting a day or so for the sap to drain out of the wood, he touches a match to the pile, starts his fan and "blooey." In a few hours, a mountain-size pile of brush is gone.

One recent use for his "homemade" fan was clearing three miles of timber for a highway through Houston's new San Jacinto industrial district. Looking at the densely forested area, it seemed inconceivable that within a few days the highway would be cleared, speeding the work to follow. The highway is the first unit of Houston's 94-mile Outer Belt. Another road was cleared in the San Jacinto industrial district as an access to industries which will locate in this fast-developing 1,100 acre district.

Another recent project for the giant fan was the clearing of 86 acres for Harris County on the Houston Parkway near North Lake. Sonnier's company was given 140 days to clear the land. The job was completed using his fan in a record 68 days.

The Sonnier Construction Company has been in Houston for 20 years and specializes in excavating, road building, drainage and railroad work. The company builds access roads for oil companies sometimes 7 and 8 miles long to the scene of operations. An interlocking wooden roadway is laid and in a few days roughnecks with their heavy equipment begin seeking the elusive black gold.







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maker of steel products for every industry

Automotive Wire Products • Baling Wire and Ties • Barbed Wire • Belts—Woven Wire Processing • Bridge Products
Chemicals and Coke • Door Hardware (Garage, Overhead, Sliding, Fire Door) • Electrical Wire and Cable • Fabricated
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Border • Gates • Galvanized Steel Strand • General Purpose Welded Wire Fabric • Grader Blades and other Cutting
Edges • Grinding Balls • Grinding Rods • Grizzly Bars • Hardware Cloth • Industrial Wire Cloth • Insect Wire Screening
Mine Rails and Accessories • Nails, Staples and Spikes • Nettings—Poultry, Stucco, Fish Trap • Overhead Conveyor
Systems • Pig Iron • Pipe—API Large Diameter • Rails and Accessories, Standard • Reinforcing Bars and Tie Wire
Rock Bolts and Metallic Fabric • Screen, Woven Wire, Industrial, Space, Vibrating • Seamless API Casing and Tubing
Semi-Finished and Hot Rolled Carbon Steel • Springs and Formed Wire • Spun and Pressed Heads and Fittings • Steel
Plates—Carbon, Alloy, Stainless-Clad, Nickel Plated • Strand and Wire—Prestressed Concrete • Welded Steel Plate Girders
Welded Wire Reinforcing Fabric • Wire (All Types) • Wire Rope • Wire Rope Slings • Wire Rods

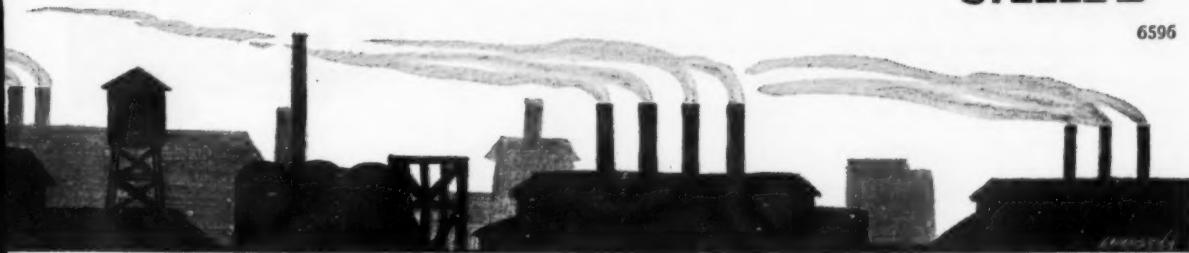
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DERRICKS LOWER

COFFERDAM FRAME

for Fort Duquesne Bridge

Pictured here is the barging and setting of the 113-ton bracing framework for a new bridge at Pittsburgh, Pa. It is for the double-decked, four-lane Fort Duquesne Bridge which will span the Allegheny River.

The framework serves both as a guide for driving the steel sheet pile cofferdam, and as bracing for the piling when the cofferdam is dewatered.

At the pier site, the frame, carried on two barges, was carefully positioned between a 50-ton-capacity derrickboat and a specially built, 75-ton-capacity A-frame derrick. To prevent the equipment from drifting with the current, the derrickboat's spuds were dropped, and the A frame was flanked by two other derrickboats, also with their spuds down.

The bracing frame was then lifted about 2 ft. above the decks of the barges, the barges were pulled out, and the structure was slowly eased to the bottom, about 40 ft. below. Four steel bearing piles—two at each end—were driven to support and position the frame.

Workmen for Dravo Corporation, which has a \$1,957,000 substructure contract with the Pennsylvania department of highways, had assembled the framework on the barges at a nearby wharf. At the same time, derrickboats had been excavating at the pier site.

The frame consists of four 90' x 25' steel bracing sets, each separated by three rows of eight up-

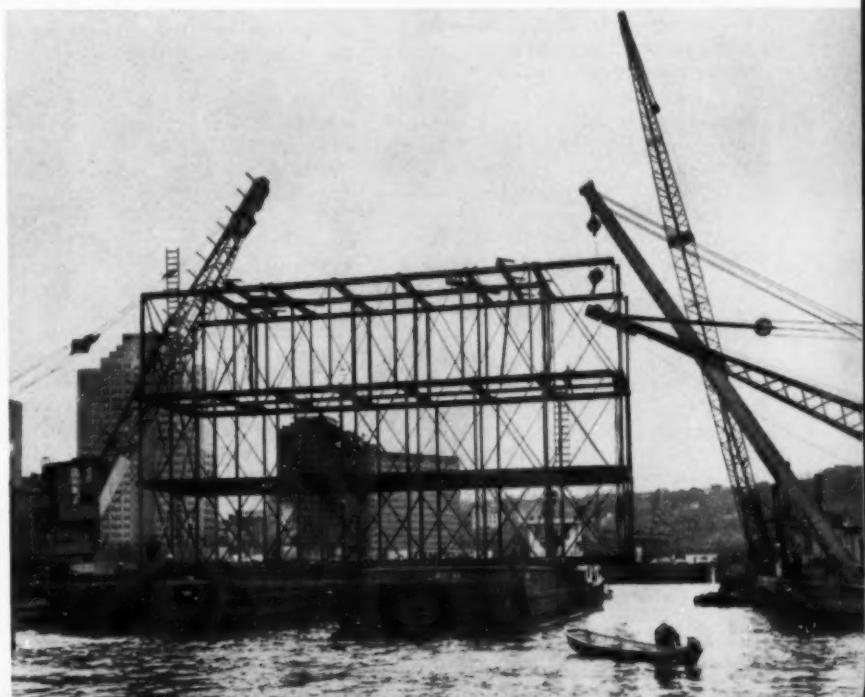
right 6" x 6" timbers, cross-braced.

Inside the completed cofferdam, excavation is carried 5 ft. below the bottom bracing set. Next, a 20-ft. thick concrete base is to be poured, with the bottom bracing set imbedded in it. The pier will be constructed on this base, the top three bracing sets then removed, the bracing frame reassembled with a new bottom set; and the whole operation repeated for the south main

pier. October 1959 is completion date for the two main piers, three smaller piers, five bents and two concrete retaining walls.

J. J. ROBSON, director of tire engineering and development of The Firestone Tire & Rubber Company, has been elected president of the Tire & Rim Association, Inc. He succeeds Paul G. Hykes, of the Budd Company, Detroit.

• Carried by barge to the pier site, the bracing frame is positioned by a 50-ton capacity derrickboat and a specially built 75-ton capacity A-frame.



• Bracing frame as it nears the bottom of the river. Pittsburgh's Gateway Center is in the background.

LIGHT BEAMS

(Continued from page 79)

lightweight structurals—Junior Beams made by Jones & Laughlin—were used instead of 2 x 8 wooden joists with an intermediary steel purlin. By using Junior Beams, the number of joists handled manually was reduced from 36 to 13 in most bays. Use of these beams also eliminated the slow mechanized handling methods necessary with steel purlins, each weighing 1,325 lb.

This advance in bridge-building techniques resulted from the foresight of J. Ted Wilkerson, general bridge superintendent for Tobin. The falsework system was designed by Jerry Holliday, company engineer.

In this method, forms were supported conventionally for each bay by 1/2-in. Richmond Saddle Ty-Hangers spaced 4 ft. on centers over the structural steel floor beams. Hangers supported double 2 x 8 in. wooden ledgers along both sides of the floor beams. Eight-inch Junior beams 14 1/2 ft. long and weighing only 6.5 lbs. per ft. were laid parallel with the main girders between floor beams and spaced 2 ft. on centers.

Floor beams are spaced 15 ft. apart across both double lanes for the entire length of the bridge. Two main girders for each double lane are spaced 25 to 38 ft.

Since the 14 1/2 ft. J&L Junior Beams weigh only about 100 lb. each, including a 2 x 4 wood nailer strip on the top flange, two men could easily carry them and place them in position from the upper work level of the bridge. No cranes, jacks, or block and sling operations were required to position them.

It was unnecessary to fasten the beams to the ledge or to maintain precise spacing. They were held in position when the standard 4 x 8 ft. sheets of 3/4 in. Plyform were nailed to the nailer strips. The plywood provided a continuous deck surface on which reinforcing steel was laid out before pouring the 7 3/4-in.-thick Haydite (lightweight concrete) road surface.

The new roadway was advanced continuously by maintaining work in 32 bays, or 480 ft. of each lane of the viaduct, in different stages of development. After the concrete had gained design strength the lightweight J&L beams were stripped from the rear bays and used again in the forward bay forms. Tobin used 1,261 Junior

Beams for the project, which was more than were required in 32 bays with maximum spacing of main girders in both lanes.

Savings in time and costs were considerably better than anticipated, both in forming and stripping operations, Mr. Wilkerson said. The speed of stripping falsework incorporating Junior Beams was demonstrated in one bay by six men who loosened the two double-supporting ledgers, knocked out and lowered 17 Junior Beams and 18 pieces of Plyform above them in 20 minutes. This operation, according to U. S. Smith, superintendent of the project, demonstrated also that the lightweight steel beams could withstand rough handling and abuse without damage.

Little fabrication was required to prepare these steel beams for the job. Acetylene torches were used to notch out the top flange on the two ends and to burn a few holes in the top flange and web for nails and

handling hooks. Holes were staggered in the top flange and used for nails that hold 2 x 4 wood nailer strips for the Plyform. It took three days for the two men with two torches to prepare all beams. Nailer strips were then nailed on the beams.

These Junior Beams will be used again on other bridges as long as the required length does not exceed the original length, or lengths reduced by cutting to meet requirements of subsequent jobs. Although Tobin engineers investigated other types of steel beams and aluminum beams, the cost of the Jones & Laughlin Junior Beams was found to be less than 60 percent of the cost of the closest competitive beams.

Consultants for the Kansas Turnpike Authority in the 18th Street Viaduct project were Howard, Needles, Tammen & Bergendoff. Robert A. Mandigo was project engineer for Tobin Construction Company.

Rust Inhibitors Worth Using

By R. L. Klug

Service Engr. Caterpillar Tractor Co.

Are rust inhibitors for heavy equipment cooling systems worth using? You've probably asked yourself this same question more than once when your equipment dealer suggested the purchase of a can of this soluble oil-type engine protector.

Over the years, they've proven their worth to a good many machine owners by helping to assure trouble-free operation of the cooling system and thereby adding to the long life built into modern engines.

The protection provided by rust inhibitor was recently demonstrated dramatically for one motor grader owner when the engine was reconditioned for the first time after more than seven years and 11,000 service hours had passed. This machine had been protected with rust inhibitor since its purchase.

Removal of the six precombustion chambers was an eye-opener. The rust inhibitor had prevented formation of the mineral deposits which are commonly found encrusting these and other parts which come in contact with the coolant in an unprotected cooling system. To restore a like-new appearance to the chamber required only wiping them off with a clean

shop cloth. No solvent or buffing was necessary. Yet, this was the first time they had been removed from the engine. Corrosion very often results in coating some precombustion chambers to the extent that a hammer and chisel would be needed to clean them.

Cost of reconditioning the machine was surprisingly low, because this owner was aware of good productive maintenance practice.

The real value of the rust inhibitor doesn't lie in the fact that the precombustion chambers appeared as good as new and that the appearance of these parts indicated a "like new" condition throughout the entire cooling system. The real value of rust inhibitor cannot be measured in appearance alone; it must be measured in terms of protection to an important and vital part of the engine. This soluble oil-type additive imparts a protective oil film or lining over the entire inner surface of the cooling system which excludes rust from these surfaces, insuring a more efficient system with full, unrestricted flow of coolant and maximum heat transfer. Even when the engine is drained for storage, the oil film remains on the surface to protect against the formation of rust.

Are rust inhibitors worth using? Are they worth the money you spend for them? Yes, they're worth the money and worth using, both from the standpoint of machine protection and operating efficiency.

29,000 lbs. - and all muscle!

Bring on those gruelling, earth-moving, profit-making jobs and just watch this mighty Dodge D800 dump truck clean them up.

It weighs in at 29,000 lbs. maximum G.V.W. It's big and tough. It's packed with power and the right equipment to get the job done in short order. Special transmission, if you need it—special axle, springs, brakes—whatever your kind of trucking requires.

Big-load hauling was never easier . . . never more profitable . . . than in new, improved '59 Dodge "Job-Rated" heavy-duty trucks with G.V.W.'s to 49,000 lbs., G.C.W.'s to 65,000 lbs.

Your Dodge dealer has full information. He'd like nothing better than to talk to you, and tell you why . . .

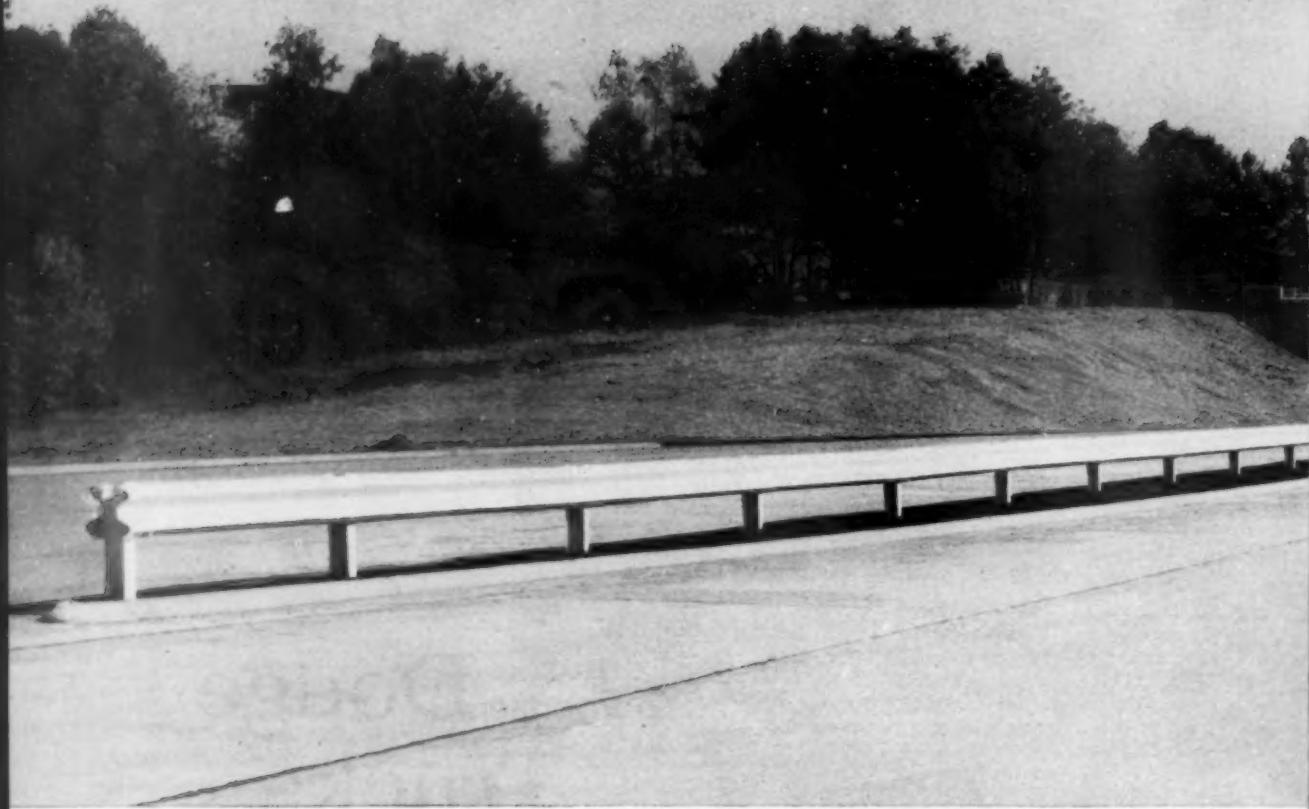
today,
it's real smart
to choose **Dodge**
Trucks



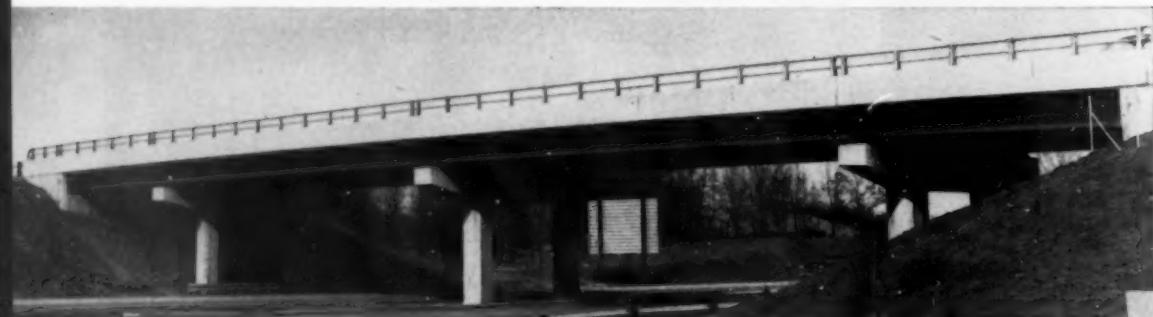
To provide maximum flexibility in loaded, off-road service and at unloaded highway speeds, a 4-speed auxiliary transmission is now offered for all conventional and tandem models in the Dodge 800 and 900 series. Another benefit for more truck buyers!



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Structural steel is clearly the best bridge construction material. Manufactured to precise, long-established standards, steel combines both strength and toughness. Structural steel accommodates spans of any length. Its strength is inherent, predictable and permanent. It can be erected quickly throughout the year—can be accurately inspected at any time. Steel structures can be connected by any method, can be altered easily. Structural steel is clearly the best bridge construction material.

USS AmBridge I-Beam-Lok steel bridge flooring combines light weight; roadway rigidity; speedy, easy erection; matchless durability, and low maintenance. There are three types—5" open, 4½" and 3" concrete-filled, and 2" concrete-filled Tee-Type Sidewalk. Top-side erection eliminates scaffolding and forms. I-Beam-Lok provides an immediate working platform for men and equipment during erection. Over-all economy is the natural by-product of the multiple savings in time, weight, bother and maintenance.





USS AmBridge Sectional Plate is the ideal material for low-cost, rapid construction of large drainage structures. It is available in Pipe, Pipe-Arch and Arch Sections, in a wide range of standard sizes and gauges for various drainage requirements. Complete structures can be transported in one truck load, and the individual plates can be handled and assembled easily without heavy equipment.

USS AmBridge Highway Beam Guard Rail is designed to withstand high impact forces. It possesses all the design features of the modern universal guard rail section adopted by most state highway departments, and offers several exclusive advantages that assure better service. Its quality, strength, ease of installation, controlled flexibility, high visibility, and low maintenance make **USS AmBridge Highway Beam Guard Rail** the finest traffic safeguard available.

build more road for the money

All American Bridge steel highway products meet the most rigid municipal, state, and federal engineering standards. All can be handled easily, installed quickly. All possess dimensional accuracy assuring precision fit in the field—by bolting, riveting or welding. Steel highway products can be installed the year round. No other construction material is so easy to extend, alter or inspect as steel.

All American Bridge steel highway products are readily available. An inquiry to any of the contracting offices listed below will bring catalogs and other desired information. Or write direct to Pittsburgh.

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Why COMPACTION?

—and How to Get It

A non-technical explanation of the reason for compaction of highway foundations, bases and pavement layers, and the types of compaction equipment and their application. Written for superintendents, foremen and operators, whose skill and understanding are so important in quality construction and efficient job performance.

History of Compaction of Construction Materials

The earliest known records of intentional pre-compaction date back to the great road construction era during the Roman Empire. Huge cylindrical shaped stone rollers, drawn by slaves, were used to imbed rocks into the earth subbase, in some cases three to five feet below the surface of the proposed roadway surface, and to compact successive layers or lifts of smaller stones to the surface level. Many of these roads are still in existence today and some in use. The Appian Way is an example.

From the era of the Roman Empire until the present, rollers in

many forms, sizes and weights have been used to compact soils, stones, and many different kinds of materials. In more recent years, rollers are also used to not only compact but to smooth such surfacing materials as macadam, natural asphalt, and other mastic materials such as asphaltic concrete or asphaltic type compounds. To date no one has developed a machine or tool that has entirely eliminated the roller as an all purpose compactor and surface finisher for heavy construction work such as roads, streets, air

strips, earthworks, dams, etc.

The evolution of roller *propelling power* has been from slaves and oxen and horses to steam engine power, gasoline tractor drawn, to self-contained gasoline or diesel engine power with modern torque converter and tail-shaft governor. Modernization also includes power steering, adequate brakes, sprinkler system, operator's cab, electric lights and starter, etc.

Many highways and streets still in use today were built during the era of early automobiles and light trucks with no thought in mind that autos would ever travel at more than fifty miles per hour, or that loaded trucks would weigh

From a booklet, "The Use and Application of Compaction Equipment," published by Galion Iron Works & Mfg. Co.



**Rollers of crude design
have been used since antiquity to compact roadways.**

more than five tons, or that there would be millions of both. Engineers designed—and states, cities, counties, townships, towns and villages built—roads and streets for loads, speeds and use considered, at the time, to be adequate for years and years to come.

Why Is the Ultimate Amount of Compaction in Subbase, Base and Surface Materials Needed Today?

However, today our cars that will travel 100 miles per hour, our trucks and our tractor trailers that weigh 50,000 lbs., and our fast buses that carry 40 to 60 people have worn out and *vibrated to pieces* these light service roads and streets to a condition that repair has become a continuous waste of public funds. Practically the same can be said of air strips and landing runways because airplanes have increased in size and weight and speed even beyond the increases in cars, buses and trucks.

The problem made evident by modern traffic, and the concept of what is to come, can be solved only by roads and streets being constructed to specifications never before used. Compaction by vibration and by static pressure adequate to resist the vibrations, weights, and wear of modern highway vehicles is the important factor. This must be in *addition* to adequate drainage of subbase and base, and the need for smooth, tough and adequately drained surfaces.

Compaction equipment of different types is and will be used on many applications other than highways, streets, airfields, and parking lots. Rollers and vibratory compactors are used to prepare building sites, dry docks, dams, irrigation projects, levees, railroad beds, and on many other jobs where a solid, firm foundation is necessary. Many types of materials are used. Different types of materials require special types of compaction equipment because of their peculiar compaction characteristics.

Compacting Characteristics of Materials

Ancient roads, as well as our recent but now inadequate roads, have been built by laying coarse stones or broken rocks as a base, over which smaller stones are spread in one or more layers of increasingly smaller sizes. Compacting these layers by tamping and inadequate weight rolling has pro-



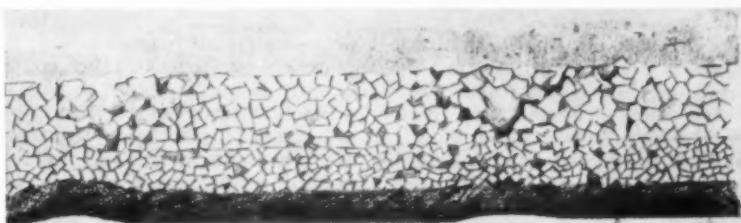
Illustrating how a pavement system is built up in layers, each densely compacted so that it will not settle under traffic loads.

duced only inadequate compaction. It has not produced a sufficiently dense base because there was not enough "shaking down" action to produce a complete filling of voids or spaces caused by the irregular stone shapes. Consequently the vibration caused by our heavier traffic loads and higher speeds has vibrated and settled base and subbase stones, causing low spots and surface pits or pools which become the commonly named "chuck holes"—which grow worse and worse by the action of constant traffic and

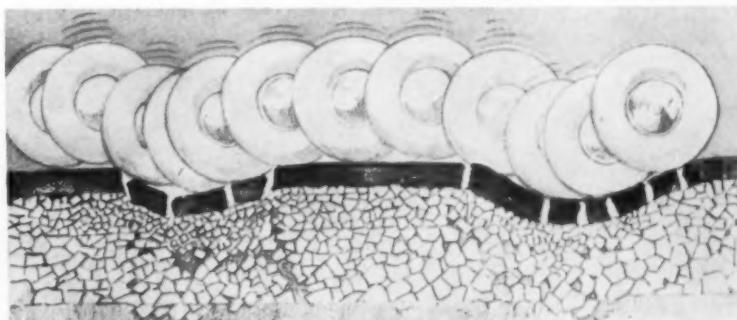
from the freezing and thawing of undersurface water retained in these voids or sink holes.

Compaction means to make compact, dense, close, snug, consolidated, heavy—in other words, to make pieces or particles fit together with the least number and smallest sized voids (spaces between) possible.

Pressure will cause compaction of some materials in proportion to the amount of weight or pressure applied. Vibration will also compact some materials in proportion to the



When base layers are not constructed and rolled uniformly, they settle unevenly, making a rough pavement.



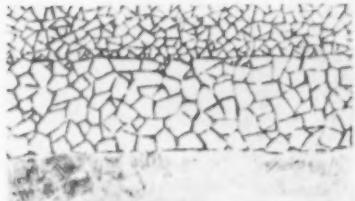
Depressions at weak spots, once started, get deeper under the action of passing wheels. Uniformity is needed in a modern pavement.



Static weight—packing or squeezing action illustrated.



Vibratory compaction, or pounding action—helps jostle poorly compacted particles closer together.



Most effective compaction combines static and vibratory action.

frequency and penetrating depth of the vibratory action applied.

Mastic, cohesive or sticky materials respond best to compaction by pressure or weight. You can compact snow into a ball with your hands—snow becomes ice in a glacier because of increasing pressure of more and more snow over it.

Solid, irregular shaped and sized materials, which have no cohesive qualities, respond best to compaction by vibration. You can "shake down" a small boxfull of stones by hand, and then have space for more stones. You can do the same thing by vibrating the box, by rapping it on the bottom with a hammer. In both cases you have caused the various shaped stones to "fit into" each other more snugly, thus reducing the voids between them.

Call it consolidation if you wish. The weight per volume has increased and you approach a solid mass in proportion to the completeness of the "fitting togetherness" or consolidation. Remember, a cubic yard of stones cut and fitted closely together will weigh more and be more solid than a cubic yard of loose, broken stones or spoils.

Sand is perhaps the most responsive to compaction by vibration. Sand is granulated stone. It may have once been any one kind of stone or a mixture of different kinds of stones, such as natural glacial deposit sand, lake sand, or river sand. Sand can be manufactured by crushing stones—limestone, sandstone, silica, granite, marble, etc. Regardless of what it came from or how it was made, sand is composed of small non-cohesive particles of stone. Most any kind of vibration or vibratory equipment will "shake down" or settle and compact loose sand—the small particles will fit more snugly together and consequently become compact. Sand on a beach becomes compact from the movement of water over thin layers of it as washed up, and by the pounding vibration of heavy waves—Daytona Beach is an automobile test speedway; however, it is not a commercial highway.

The problem of compaction of road building materials is how well it must be compacted to meet engineers' specifications. The problem of the road builder, therefore, is how deeply will a roller or vibrator compact to the specified density, and how economically can it be done.

Application of compaction equipment. To fully understand the application of compaction equipment, it is necessary to keep in mind the fact that a dense, durable, strong mass is the end result desired of all compaction whether it is a subbase, base, or a surface course. To achieve this end, several combinations of compaction equipment can generally be used. Only seldom do conditions make it possible for a single compaction tool to accomplish all of the specification requirements. Therefore, it is well to know the general limitations and uses of the compaction equipment described on the following pages.

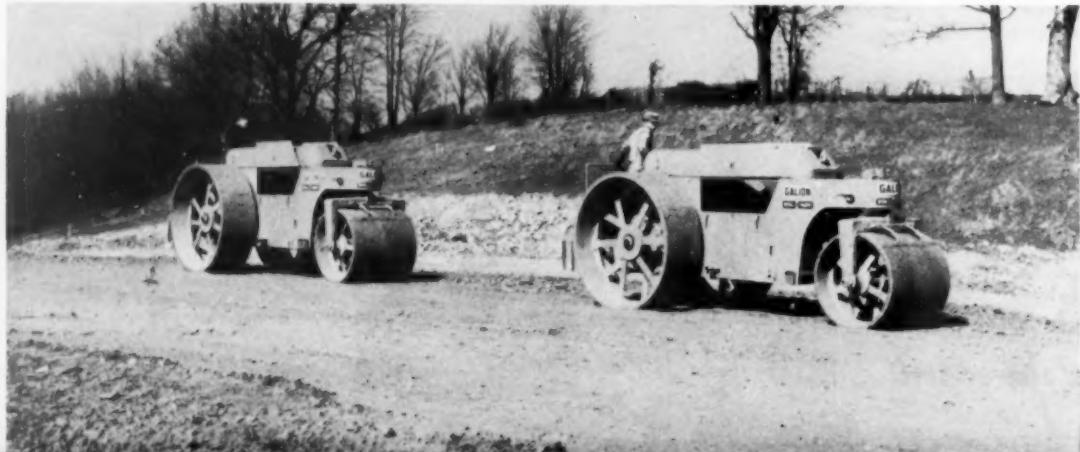
TYPES OF COMPACTION EQUIPMENT

Compaction by Static Weight. Under this classification are included iron or steel tire rollers, pneumatic tire rollers and spike or sheepfoot rollers.

Iron or Steel Tire Rollers are divided into two classes—three-wheel rollers and tandem rollers. Both classes are made in several (metal) weights and the three-wheel roller is furnished with spoke type or with ballastable rolls, i.e. steel drum rolls which can be weighted with water to desired pressures to the lineal inch at surface contact. Tandem rollers are supplied only with ballastable rolls. Both classes are made with several roll widths and diameters.

(Continued on page 127)

Three-wheel steel rollers, one of the basic roller types widely used for base and pavement compaction.





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That's why concrete will stand up not only to rated axle loads in *normal* volume, but even in *peak* volume,

with such loads running bumper to bumper . . . and last an expected 50 years and more. Reserve strength like that saves taxes and complaints. It's a big reason why upkeep costs will run as much as 60% lower than for flexible pavement.

Concrete often saves money in other ways, too. For example, on the Indiana Toll Road, engineers drew up designs for both types of pavement, proved concrete would save \$9,740,000.

And truckers are the experts who can tell you that today's concrete means gentle treatment of cargoes. It's the flattest, smoothest-riding pavement there is. Small wonder concrete is the preferred pavement for the Interstate System and other heavy-duty highways.

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A national organization to improve and extend the uses of concrete

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...Unloads 120 Barrels In 36 Minutes!



FASTER UNLOADING and lower equipment cost are the two big assets of Fruehauf's new "Airlide" Pressure Tank-Trailer for bulk cement and other powdered commodities.

This economical unit is capable of pumping aerated cement at a rate of 3.33 barrels per minute for a distance of 105 feet or more, including up to 85 feet upwards into storage elevators. The Trailer has a 105 to 120 barrel capacity, and is equally suited to many powdered solids. Pneumatic unloading through a 4-inch hose at 11 pounds pressure is accomplished either with a tractor-mounted blower connected to the power take-off shaft or with a gasoline engine mounted on the Trailer.

Now, unloading is easy and economical anywhere, because cross conveyors and bucket elevators are not needed with this new Fruehauf. Discharge acceleration is easily controlled manually by a wheel-type valve. For full details at once, write Fruehauf Trailer Company, 10949 Harper Avenue, Detroit 32, Michigan.



**"Airlide" — Trademark, Fuller Co.

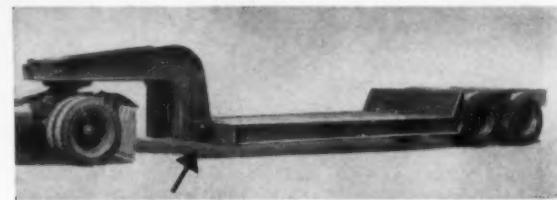




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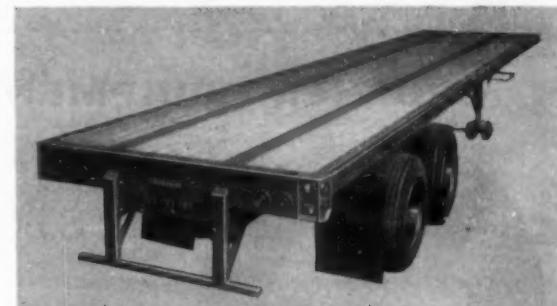
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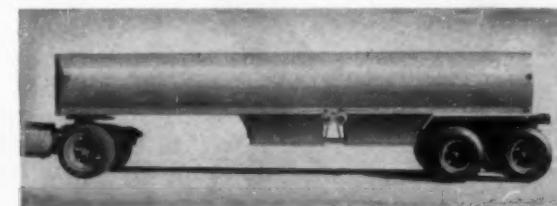
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*For Forty-Five Years—
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On The Road
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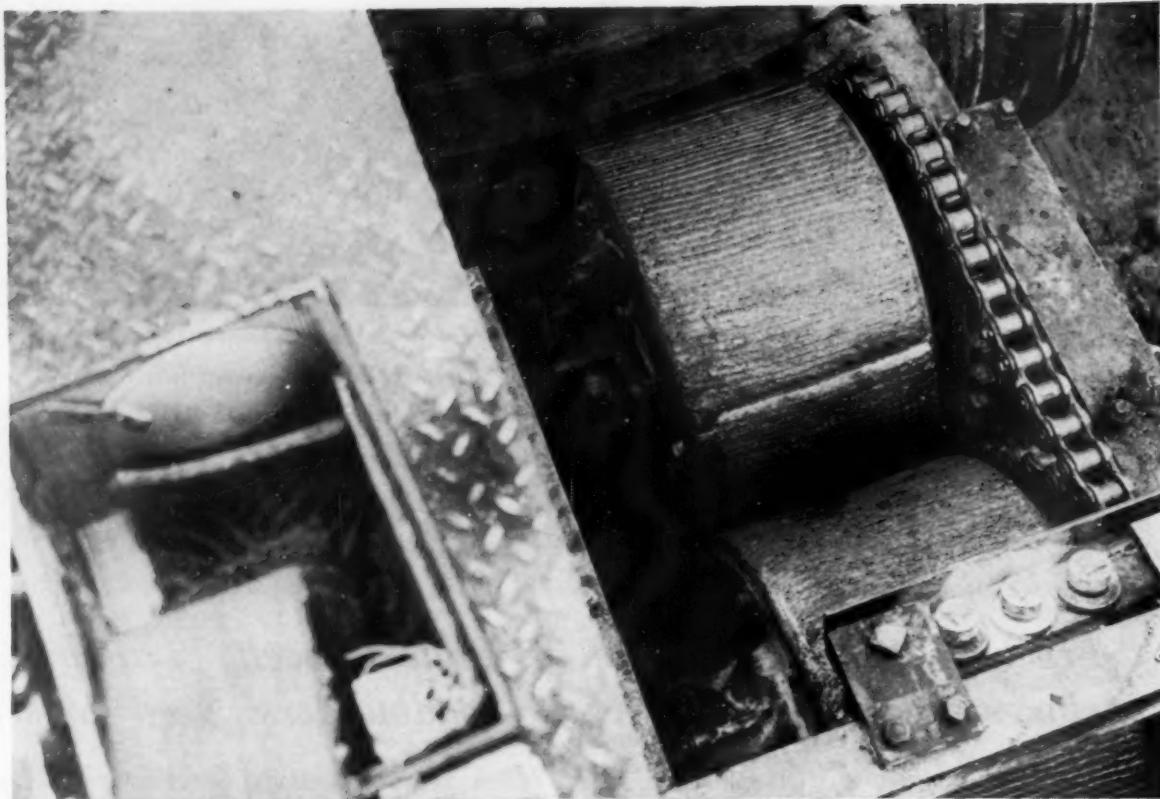
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ROADS AND STREETS, April, 1959

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CRUSHER EQUIPMENT FOR SUPER HIGHWAYS

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STOODY SEMI-AUTOMATIC HARD-FACING



Stoody Semi-Automatic wires are available in a variety of alloy types for all job requirements. They can be fed through most standard semi-automatic welding machines.

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Near Grants, New Mexico, a new super highway is under construction. Keeping crushers in operation to supply aggregate is a tough job. Roy Hartman, the welder, states, "I like to hard-face with the Semi-Automatic machine. On crusher rolls, I can lay down from $7\frac{1}{2}$ to 10 pounds of Stoody 100 per hour but only about half that much when applying manual electrodes—even though working hard. Semi-Automatic hard-facing makes my job easier."

To lick the toughest jobs fast, with less wear-and-tear on yourself, just try Stoody Semi-Automatic Hard-Facing. A variety of alloy types cover all hard-facing requirements. If you'd like a demonstration in your own plant on your work, simply ask your nearest Stoody Dealer (see the "Yellow Pages" of your phone book) or write direct to the company.

STOODY COMPANY

11908 East Slauson Avenue • Whittier, California

ROADS AND STREETS, April, 1959

COMPACTI

(Continued from page 122)

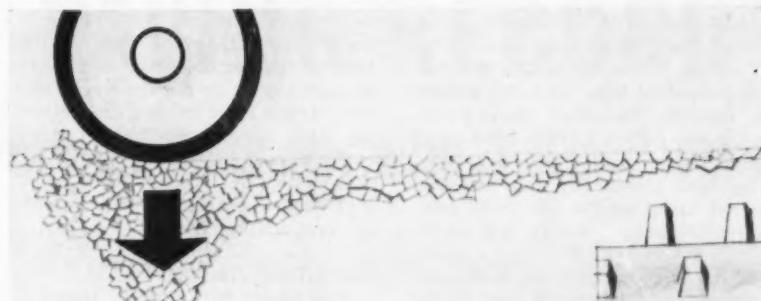
3-Wheel Rollers

The three-wheel roller derives its name from the fact that it has three wheels or rolls. The steering roll is centered on the frame and is a "split" roll—actually two rolls on one axle revolving free of each other to give easy steering and to minimize surface slipping, scuffing and dragging on curves or turns. The two large drive rolls are the maximum compression rolls. They are located outside the frame following the steering roll, and their tires lap or cover the edges of the compression pattern laid down by the steering roll.

The three-wheel roller is the best known static weight compacting machine throughout the world. It compacts practically all types of materials. It smoothes surfaces and is easily maneuvered. Three-wheel rollers are built in sizes from seven to twelve tons metal weight. All sizes can be had with spoke or ballastable rolls to obtain the weight or compaction desired.

The *Tandem Roller* derives its name from the fact that the rolls are *centered in line* or in *tandem*. A tandem roller may have two or three rolls. When it has three rolls centered in line, it is called a three-axle tandem.

Tandem rollers are made in many sizes, roll widths, roll diameters, and total metal weights from three to fourteen tons. Ballastable rolls are available on all models. When a roller is listed in dual weights, such as 8-12 tons, it indi-



Arrow represents the static force of compaction exerted by a steel roller wheel.

cates the approximate metal weight is eight tons and the rolls can be ballasted to give approximate weights ranging up to approximately twelve tons. Compaction results per ton of weight are less than with a three-wheel roller because the wider rolls spread its weight over more surface than does the three-wheel roller.

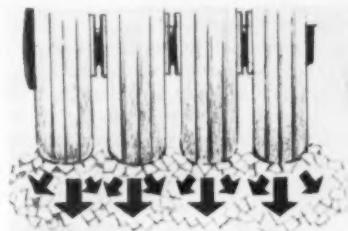
Tandem Rollers are generally used for the compaction of asphaltic mastic materials on highways, streets, parking lots, airports, etc. The wide rolls act as "ironers" leaving surfaces smooth and unmarked. Frequently used also on roads to roll the surface of soil cement base to produce a final smooth surface.

Small Tandem Rollers, 3-5 Ton and 4-6 Ton Retractable, are generally classed as maintenance or patching rollers. They are used on relatively small jobs of resurfacing, patching, or construction of small parking lots, driveways, walks, etc., where limited movement space is a problem.

Compaction by Means of Kneading Action

Pneumatic Tire Rollers

The *Pneumatic Tire Roller* also employs the principle of the wheel. Wheels are equipped with pneumatic tires instead of having flat steel rolls. Wheels are usually mounted on two axles in tandem and aligned so the rear tires track to more than cover the spaces between front tire tracks. Various compaction weights are attained by use of a ballast box which fundamentally



Showing how a row of pneumatic tires acts to compact and also provide kneading action.



Two-wheel and three-wheel tandem steel rollers also find wide application. The latter (shown) is used for precision or finish rolling, the middle roller serving to iron out remaining bumps.



A modern self-propelled rubber-tired roller, such as is finding increasing use for paving work today.

is also the frame or chassis. Sand, soil, gravel, metal, or stones serve as ballast. These rollers are built in self-propelled types and for towing by tractors. So called small pneumatic tire rollers have from 9 to 19 wheels and weigh from 5 to 50 tons. The most commonly used self-propelled units weigh about 10 tons fully ballasted. Others are made which weigh from three tons metal weight to 100 tons fully ballasted. Pneumatic tire rollers are being used on almost every type of roller compaction operation on which steel tired rollers are used. They have a place in the field of compaction because they can produce high pressures per square inch and are efficient in overcoming "bridging" or "pyramiding" of base materials.

On soil-type bases they apply a kneading action that helps to consolidate the material. They are being used on hot bituminous surfaces to secure compactive pressures comparative to heavily loaded trucks and buses; also to test the bearing capacities of embankment and subbase materials. When pneumatic tired rollers are applied on bituminous surfaces, the final rolling should be done with a tandem roller to remove all marks and irregularities caused by the tires.

The large rubber tire towed-type rollers are similar in principle to their small brothers, but differ in that they ordinarily use four wheels with very large tires—lined up side by side on individual knee action axles so they float or oscillate vertically to allow for surface irregularities. This tire alignment leaves uncompacted spaces between the tires, and extra passes are required

to complete the job. They range in total weight from 50 tons to 200 tons including ballast. They are usually towed by crawler type tractors. These large rubber tire rollers are used mostly to compact deep earth fills in lifts from 6 to 24 in. or more. The heavier types carry high pressure tires and exert greater compaction effects.

Sheepsfoot Rollers

The *Sheepsfoot Roller*—Today a large, heavy steel drum with 72 or more long projections or shaped lugs is called a sheepsfoot roller. Originally a sheepsfoot roller was a heavy section of a hardwood tree trunk into which was driven many forged iron spikes or lugs with ends shaped like a sheep's foot. The compacting lug ends were shaped like a sheep's foot because it sinks into soil easily and pulls out neatly or cleanly. A sheep's foot is also small compared to the animal's weight, and consequently the compacting effect of many sheep's feet running over and over the same path or area was known to compact loose soil quite deeply—thus evolved the idea and the sheepsfoot roller.

Today a ballastable drum roller with many tapered or cone shaped lugs with flat ends may also be called a sheepsfoot roller or sheepsfoot type compactor. There may be assemblies of one, two, or even four such rollers used to break up earth lumps, reduce air voids in soils and clays by the kneading and tamping action of these sheepsfoot rollers. They are practicable compactors on most types of soils, but many passes are required to do really effective compaction jobs. Many sizes are

built, with ballasted weights up to 18 tons or more, producing pressures to 725 lb. per sq. in. of bearing area. Pulling power is usually applied by large crawler type tractors.

In the construction of large earth structures—such as dams, embankments, highway, street and landing strip subbases, and structure foundation bearing pads—it is usually necessary to compact loose earth fills in layers or lifts. Here sheepsfoot rollers compact the soil as it is spread in layers of proper thickness, consolidating the layers "from the bottom up" layer upon layer until the roller "walks out" and the top level is attained.

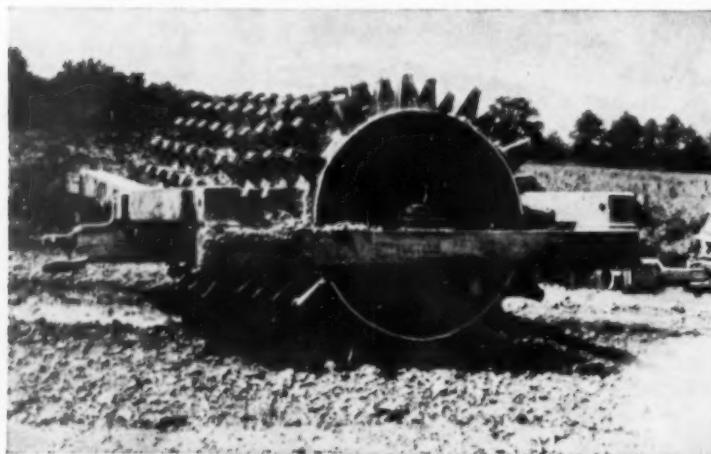
The drawback to this type roller is the limitation of the depth of each layer that can be compacted, and the lack of uniform density of the compacted material. With the increase in size of earth-moving equipment this factor becomes critical, and other means of compacting deeper layers or lifts are being used by contractors, such as pneumatic-tired rollers and vibratory compactors. Sheepsfoot rollers are of little value in compacting granular materials.

Special Purpose Compaction Rollers

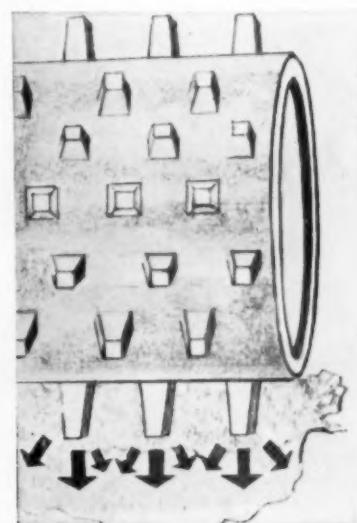
The Retractable Wheel Roller

is a tandem roller, usually in the four to six ton class, with an attachment having two pneumatic-tired

(Continued on page 133)



The familiar sheepsfoot roller, used chiefly for foundation or embankment layers.



The sheepsfoot roller, too, combines static pressure with kneading.

WORLD'S PAVING RECORD!

by Denton Construction Company with 3 Rex Pavers



Denton Construction Company is owner of five Rex Pavers.

It's happened! 6029 *linear feet* in just 12½ hours—over a mile and a third a day! That's the amazing rate achieved on a recent Michigan highway job with concrete pavement 24' wide—9" thick. Denton Construction Company, Detroit, did it! And it's believed to be an all-time world's record!

Handling this Herculean production were three Rex Pavers. These worked without letup as a perfect team, taking the batches as fast as the trucks could

bring them in. Production per hour *per paver* averaged 107 cu. yd. over the entire day.

One of the many Rex Paver features which helped total up such high, continuous production is Rex Hydrocycle®. This advanced control literally *automates* paver operation for split-second coordination of the complete paver cycle. It eliminates the lost time of manual operation and control.

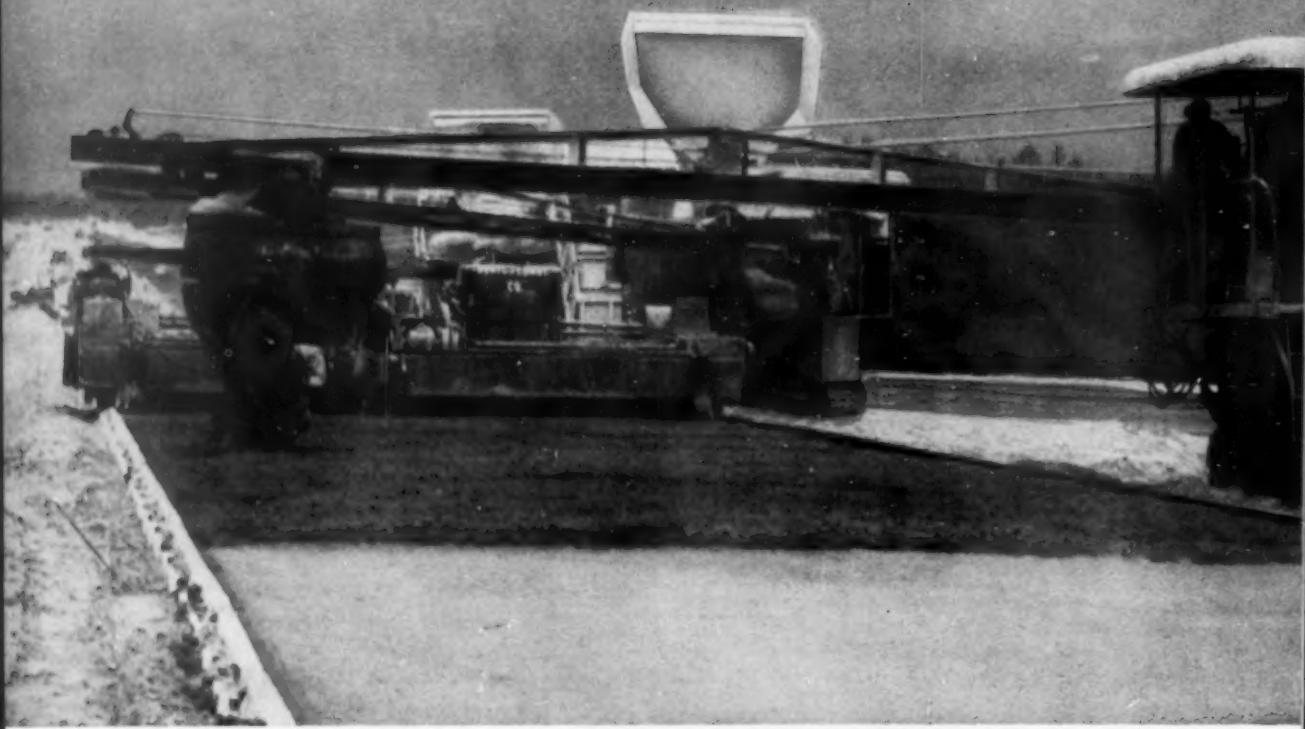


Big picture catalog on Rex Pavers is available from your Rex Distributor or CHAIN Belt Company, 4652 W. Greenfield Avenue, Milwaukee 1, Wis. In Canada: CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave. East, Toronto, Ontario. Distributors in all principal cities of the world.

REX®

CONSTRUCTION MACHINERY

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Record-holding Denton Construction Co. says:
"Shooting for paving records?"

An efficient batch plant... plus Macks to carry the dry mix, means that Denton's pavers are always supplied for full-capacity operation. Says Denton: "We shoot for high-speed productivity, through a balanced use of the most efficient equipment. For important, heavy-duty jobs like hauling the dry mix—that meant Macks."

* * *

There are Macks, heavy- or super-duty, for every construction job: excavating... filling... equipment hauling... aggregate and materials hauling... concrete, dry-mix and asphalt hauling.



MACK
FIRST NAME FOR
TRUCKS



6,029 feet of 9" x 24' concrete slab in a single day

—a national record—was poured and paved last summer by Denton Construction Company in Michigan. Heading up the

impressive array of equipment during this remarkable feat is one of the 5 Mack B-42S and 11 B-421S dumpers that Denton used to keep the paving machines going full blast.

.better use Macks"

"Naturally," says Ed Denton, vice president of Denton Construction Company, Grosse Pointe Woods, Michigan, "Macks were part of the team when we made our record pour. But we didn't put Macks on merely to break records.

"Steady, flawless, high-speed paving on all jobs is our key to profits. This places a premium on an *uninterrupted* flow of dry mix to the pavers—our main reason for using Macks. But there are other advantages, too.

"Economy, for instance. Macks cost us less to own and operate. For one thing, their steady performance and perfect availability have allowed us to get along with fewer batch trucks—a big saving. And Macks stay in top condition for years with only routine attention—again we save money."

In short—Denton finds that Macks have what it takes—in work capacity, in performance, and in economy. So whether you're going after paving records, or whether

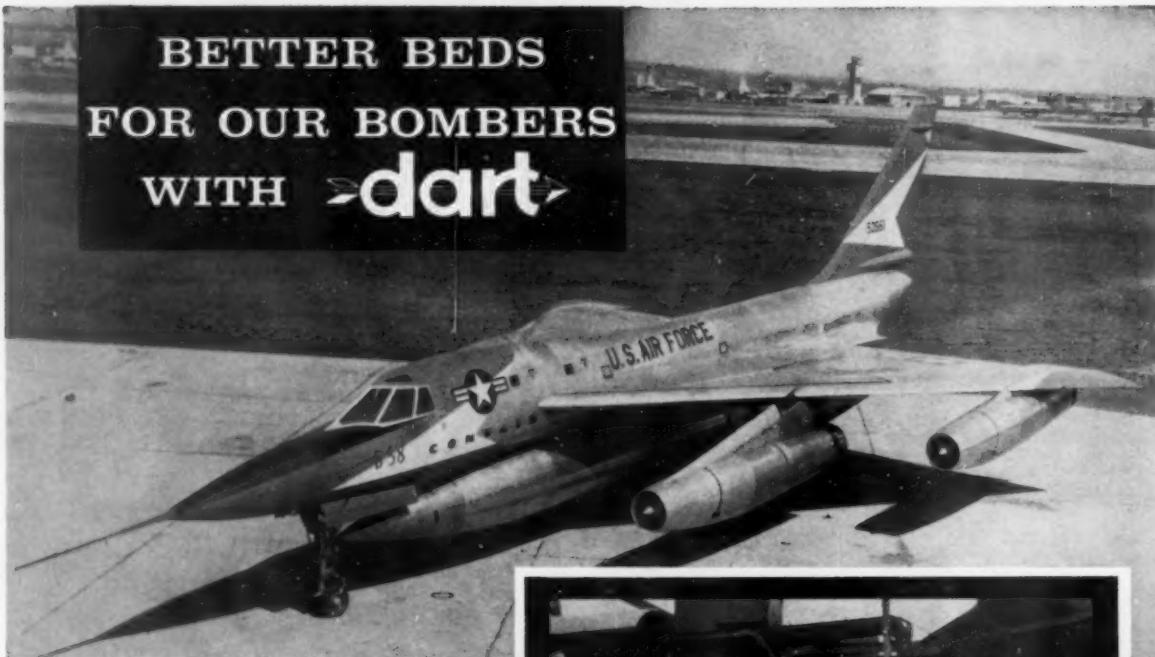
you're anxious to improve your general profit picture, Macks will give you the best kind of start. Want definite proof? Ask your Mack branch or distributor for the names of local Mack users. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.



A minimum number of Macks is needed to handle a big job... even when Denton is operating full speed ahead. According to Denton, "Two Macks, properly used, can outwork three other-make trucks of equal rating during the course of a season's operation."

... for more details circle 341 on enclosed return postal card

BETTER BEDS
FOR OUR BOMBERS
WITH **dart**



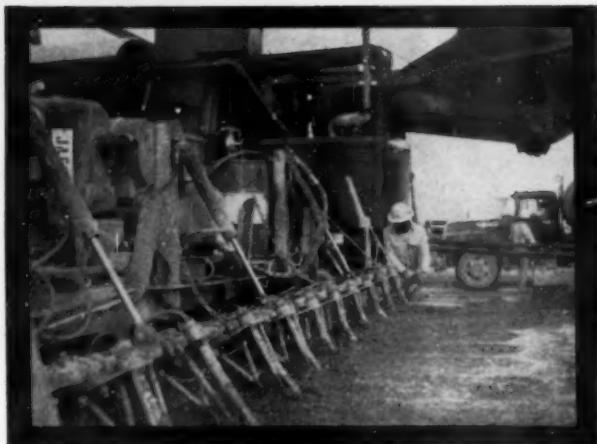
*Photo of USAF B-58 Bomber courtesy Convair Division,
General Dynamics Corp., Ft. Worth, Texas*

When a jet pilot touches his bird down on a bed, it means that he has landed tons of high speed aircraft on a concrete runway — a runway which must withstand tremendous forces and weight repeatedly for today's flying requirements.

These runways *must* have high quality, well consolidated concrete. Dart's screed battery of high-cycle vibrators with in-head motors offers contractors the means to produce the quality concrete to meet these demanding specifications . . . and with less manpower, less time lost, lower costs and greater performance than ever before made possible.

FOR EXAMPLE: Dart's last screed job for a SAC runway extension used 13 Model DHC-100 high-cycle vibrators hooked into a 15 KW generator. This vibrator battery, operating over a 25' width and consolidating concrete with a minus 1½" slump, 34" depth and a 2½" aggregate, handled all the concrete that two Koehring spreaders could furnish as fast as they could pour!

Specify DART on your next large highway, dam, runway or launching pad job. Write for details or see your nearest DART distributor. There are 87 authorized DART sales and service branches in the U.S.A.



Four Reasons to Specify Dart Vibrators:

- 1** In heavy pours, high-cycle vibrators *must* be removed from concrete while motor is running. DART's DHC-100 high cycle vibrators minimize burn-out problems common to most other vibrators. Dart units may be removed without the concrete acting as a coolant.
- 2** Easy to service. DART's high-cycle vibrators have a complete removable motor section assembly, taken off and replaced in minutes. Only the motor section need be carried as a service item and is easily carried in a service kit.
- 3** Versatile, DART high-cycle vibrators may be used in either screed battery for wide pours or may be detached and used conventionally merely by adding additional lengths of pre-loaded handling hose and switch.
- 4** Complementing "pan" vibration, the DART high-cycle vibrators may be installed at rail or form at each side to produce quality consolidation. Easily powered by one small 3 KW 180 cycle generator.

IF IT VIBRATES DART MAKES IT!



MFG. & SALES CO., 1002 SOUTH JASON STREET, DENVER 23, COLORADO
EXPORT DEPARTMENT: P. O. BOX 1051, DENVER 1, COLORADO

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COMPACTION

(Continued from page 128)

wheels arranged so they can be used to carry most of the weight of the roller; and so it can be easily towed from place to place without loading it on a trailer or truck. When these transporting wheels are raised or retracted and the tow bar disengaged, the roller is immediately ready for use.

The Trench Roller

is so named because it is designed to compact materials which are applied above, below, or at a lower level than the adjacent surface of a street or roadway, i.e., in a trench. Trench rollers have one or sometimes two large diameter wheels with comparatively narrow steel tires. Usually self-propelled by gasoline engines, the chassis with operator's seat or platform is carried on pneumatic-tired wheels which ride on the existing surface or pavement. The compaction rolls may be spoke type metal weight only or the ballastable variable weight drum type roll. This compaction roll axle is so constructed to allow for varying trench depths, always allowing



Modern multiple-shoe type vibrating compaction in action on a highway subbase layer.

the full weight of the roll to be applied to the material being compacted in the trench. These special rollers are used mostly to compact the material used on road and street widening jobs, primarily where the area is not accessible to other types of rollers.

Compaction by Vibration (Vibratory Compactors)

Vibratory compaction of construction materials forming foundations or bases has become more acceptable in the past five years than ever before. This increase in popularity has been due primarily to the fact that deeper penetration of the compactive effort on most granular materials can be secured through vibration than by any other method. Deeper lifts of most loose materials or aggregates can be compacted with vibration than any other method.

The principal limitation to vibratory compaction is on soils having too much clay or silt. Soils containing too much clay develop very low internal friction; therefore do not set themselves when vibrated. Soils containing more than 15% clay do not lend themselves well to vibratory compaction.

The *Vibratory Compactor* as now known in the construction industry for compacting subbase soils and layers of base stones and (fines) smaller stone fillers, is an application of a vibrating mechanism mounted on a steel plate or shoe. This vibrating mechanism is usually actuated by electric, mechanical, or hydraulic power. The shoes vary in width from 20 to 30 in. These vibrating units are mounted

side by side in gangs of two to six units, and operate free or independent of each other. The engine powers a generator, hydraulic pump, or mechanical shaft which energizes the vibrating shoes. Compaction of the material under the shoes is achieved by the penetrating vibration of the total load (shoe and motor weight) at frequencies from 1200 to 4500 vibrations or impacts per minute. The compacting energy developed by this weight-plus-vibration action varies from 4000 lb. to 8000 lb.

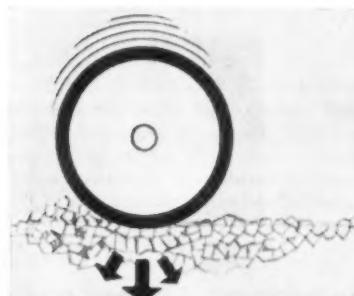
The consolidating effect on different kinds of materials varies in proportion to their resonance factor. Vibratory compaction tests of the materials are, therefore, advisable before proceeding with any compacting job. The depth of compaction efficiency is also dependent on this factor.

Vibrating Rollers

There are several varieties of vibrating rollers. They utilize either a steel roller or pneumatic-tired wheels, and are self-propelled or towed units. The roller unit is vibrated, at a comparatively low frequency, by an independent engine. This type of machine offers a compromise between static weight compaction and vibratory compaction—with the result that on machines of comparable size the vibrating roller does not achieve the full efficiency of either the static weight roller or vibratory compactor operated as individual units.



How a vibrating shoe acts to compact a layer of material. The vibration aids in compacting to considerable depth.



How a vibrating wheel acts on a pavement layer.

(Continued on page 136)

SWAMP FILLING

(Continued from page 37)

4,000 ft. haul distance, 7 Cat DW21 tractor-scrapers and one DW15 moved 33,000 cu. yd. On another section of the project, three LeTourneau "Cs" and three D8-drawn scrapers produced 6,000 cu. yd. per 9-hour day over a haul distance of 1,000 ft. The borrow requirements to bring the roadbed to grade will total approximately 825,000 cu. yd.

In order for operators to work in the extreme cold, machines were equipped with canvas covers or cabs. Working conditions often required lights during the daytime because of blowing sand in high winds. Further complications came from wet borrow material which lodged and froze between the pan and the scraper draft arms. Often it was necessary to use pry bars and sledge hammers to dislodge chunks or thaw the material with fire.

● *Veteran Force.* Throughout the duration of the

swamp excavation and backfilling, the contractor's force worked a 9-hour day week and 8 hours on Saturday, 53 hours per week. The company's 42 operators have been with the Wisconsin firm an average of nearly 10 years. Length of service ranges from 3 to 28 years. F. L. Carr, Arnold V.P., is in charge of grading. Wally Schulenberg is the contractor's engineer and Phil Dudenhofer is superintendent in charge of grading. Hallie Dudenhofer, Merton Skaar, Martin Brynteson, Bob Nordahl and Merle Calkins are grade foremen. Pipe and labor foreman is Peder Rognli. Time-keeper is Marlyn Brenden. Ralph Ring is chief mechanic assisted by Laurence Jacobson and Bill Tait. All field maintenance is handled during regular working hours.

Both projects are under the supervision of District No. 6, Wisconsin Highway Commission. E. R. Holm is district engineer; R. N. Morrie is construction engineer; and Kenneth Hogenson is area construction supervisor. The resident engineers on the project are Dale Fenley and Marlin Beekman.

Arnold's Winter Fleet

Major equipment used by L. G. Arnold, Inc., during winter months on the two adjoining Interstate Route 94 projects.

Quantity	Rubber-Tired Haul Units		Motor Graders
7	Cat DW21-No. 470 tractor-scrapers	1	Adams 660 grader
3	LeTourneau-Westinghouse "Cs"	4	Caterpillar 12 motor graders
2	Cat DW15-No. 428 tractor-scrapers		
	Crawler Tractors		Miscellaneous
2	Cat D9 tractors with push cups	3	15-ton sheepfoot rollers (LeTourneau, American, Bros)
1	Cat D9 tractor with bulldozer	1	Vibro-Plus roller
5	Cat D8 tractors with bulldozers	1	La Plante Choate RP 82 ripper
1	Allis-Chalmers HD21 with bulldozer	1	Rome disc plow
1	Allis-Chalmers HD11 with bulldozer	3	Hydro-Pac rollers
7	Caterpillar D8 tractors with 4 scrapers	1	LeTourneau K-30 ripper
5	Cat D7 tractors with bulldozers		
1	Cat D9 tractor (rented) with No. 9 ripper and bulldozer	Crane	Northwest Model 41 (clam and dragline)
1	Cat D4 tractor with bulldozer	1	Northwest Model 25 (clam and dragline)

Court Decisions

Verdict on Subcontractor's Revocation of Bid

Required to include in his bid for a school construction job the names of subcontractors undertaking one half of one percent or more of the construction work, a general contractor in California included the bid for the paving work for \$7,181.60. Basing his own bid on this as well as those of other sub-

contractors the general contractor was awarded the contract.

On the following day the paving subcontractor refused to carry out his agreement, saying that he had made a mistake in his bid he had submitted, which should have been at least \$15,000. The paving work was performed by another firm for \$10,948.60. In its decision of the suit against the subcontractor the court in awarding judgment for \$3817 to the general contractor, said, that if the subcontractor's bid had expressly stated or clearly implied that it was revocable before

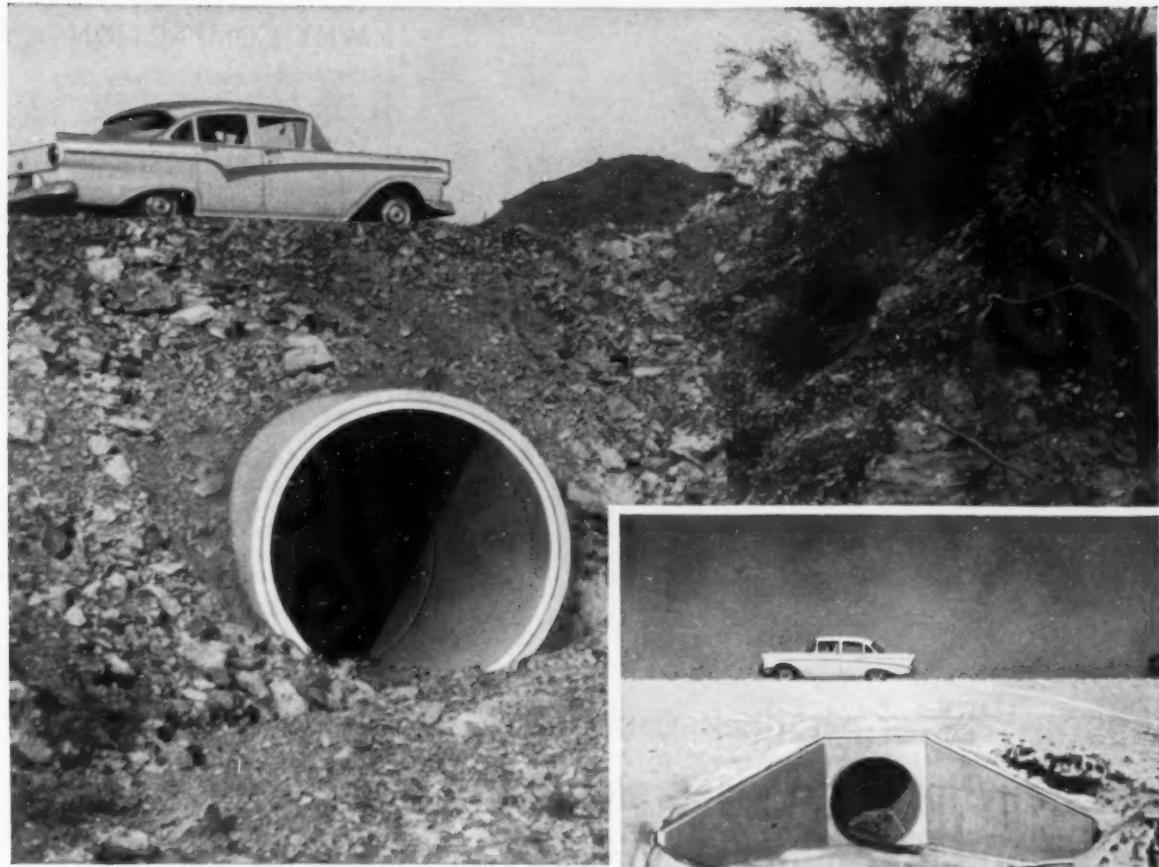
acceptance, it would be treated accordingly.

"A promise which the promisor should reasonably expect to induce action or forbearance of a definite and substantial character on the part of the promisee and which does induce such action or forbearance, is binding if injustice can be avoided only by enforcement of the promise."

• •

REFERENCE

Drennan v. Star Paving Co., 333 Pac. 2d 757, Cal., December 31, 1958.



Broiling heat to subzero cold...

modern concrete culvert pipe stand up to any climate, solve drainage problems permanently

Whatever the weather, you can depend on concrete culvert pipe. Concrete pipe are engineered to resist cycle after cycle of freezing and thawing, give years of trouble-free service.

The hard, smooth walls of concrete pipe are also highly resistant to abrasive debris carried by rushing water. And concrete can't rust. A 100-year

service life expectancy is reasonable for concrete pipe.

As for water-carrying capacity—you won't find any pipe that's better. Concrete pipe's roughness coefficient is recognized as the lowest of commonly used culvert materials. Entrance losses are considerably lower than for other culvert materials. Extra heavy seasonal flows are

easily handled by concrete pipe.

Count on concrete pipe for low cost and high strength. And it's always readily available. Today, more and more engineers are choosing concrete pipe for drainage jobs of all kinds on modern roads and highways—whatever the weather.

PORLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete





Austin-Western hydraulic crane gently lowers a 3-ton block of concrete into place on flat bed truck.

Austin-Western hydraulic crane does anything . . . goes anywhere on \$6,500,000 highway project

"It's fast, mobile and versatile. We use the Austin-Western hydraulic crane to do just about everything on the job," reports Norman J. Maggione, general superintendent and vice president of the Bero Construction Co., Waterloo, N.Y.

Two places at once

Bero's \$6,500,000 project, a part of the Niagara section of the New York Thruway calls for six bridges in 1½ miles. Mr. Maggione says, "We have one A-W crane on the job and wish we had more. Our job is split in sections by railroad yards and city streets. Because of their speed and mobility, the self-propelled, rubber-mounted A-Ws can just about be in two places at once.

"Using the A-W crane has doubled our speed in setting bridge panels. It maneuvers easily among tubular pilings

and can turn on a dime. It has plenty of traction and power on any type surface.

Economical to operate, maintain

"We've got lots of economy right along with outstanding job performance. One man on an A-W can often do the work of four. We haven't had any maintenance problems.

"The A-Ws are radio-dispatched. People are always calling for one to get them out of a spot or to speed things up. It's the most versatile piece of equipment on the job!"

Learn more about this Model 210 hydraulic controlled precision crane with 18-ft. telescoping boom and 360° swing, all-wheel drive and steering. Contact your nearby Austin-Western distributor or write us today.

Austin  **Western**
CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN • LIMA • HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes
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WHY COMPACTION

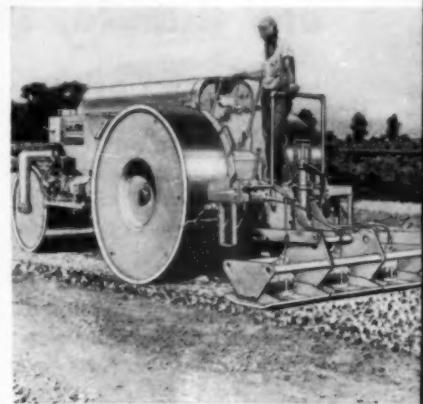
(Continued from page 133)

Compaction by Vibration Plus Static Weight

The 3-Wheel Roller with Electric Vibratory Compactor

Inasmuch as rollers have proved their value for the compaction of many types of soils and materials, also their indispensability for smoothing surfaces, and the fact that vibratory compactors have recently proved their efficiency for consolidating subbase and base materials, the world's largest and most aggressive manufacturer of rollers now combines the two in one unit—a three-wheel roller with an electric vibratory compactor which *operates with equal efficiency in both forward or backward direction*. *Two compaction units in one*—thus saving the difference in cost of buying two separate units and the labor of one operator. One man operates the combined units. Either unit can be operated separately or both at the same time, either forward or backward as needed for the job to be done. The efficiency of the vibratory compactor is the same as obtained by a separately powered and operated unit. The compaction per square inch of the rolling unit is increased by the added weight of the vibratory unit which it carries.

The vibrating motors are powered by a generator driven by a



Vibrating shoe being used in conjunction with a steel roller which irons out the surface ahead of rolling. This type of compactor is also used as an attachment on a motor grader (not shown), the blade smoothing out the material ahead of the vibrating shoe.

gasoline engine. Both are mounted on the side of the roller frame. This power unit (engine and generator) when not in use for activating the compactor motors, can also be used as an electric generating plant for lighting or to operate small electric power tools commonly used on construction jobs. A truly modern, time saving, cost reducing, efficient piece of equipment for modern day construction work.

Compaction by Surface Leveling Plus Vibration

Motor Grader with Electric Vibratory Compactor

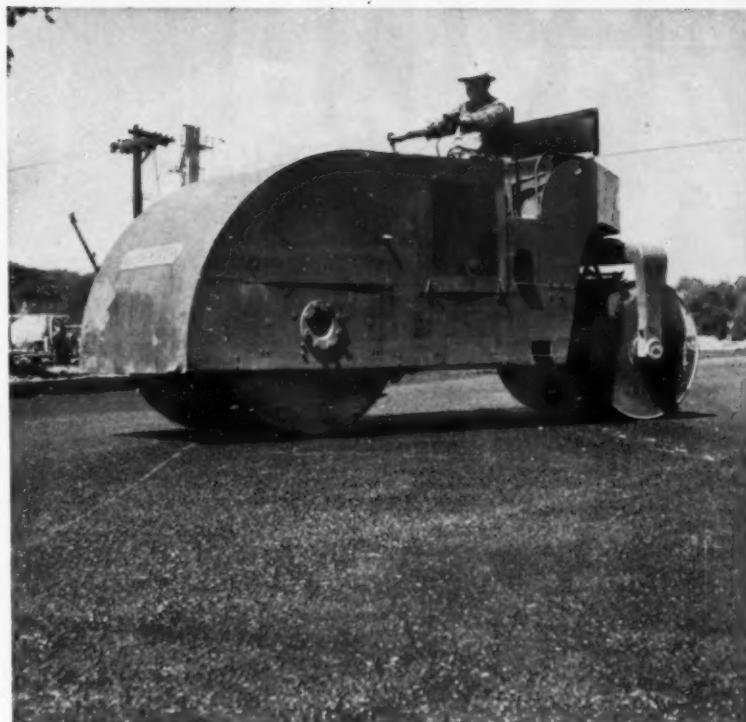
Also two valuable, efficient units in one. The same engineering foresightedness by the same manufacturer has combined a motor grader with an electric vibratory compactor for similar economy reasons and to increase the efficiency of the vibratory compactors.

The compactor units are placed just behind the grader blade. Two jobs are done in one pass—the blade smoothes or evens the material before the compactor shoes travel over it; the surface is compacted uniformly and the depth of compaction is increased because the whole shoe surfaces of the compactors contact the material. They do not have to ride over lumps or loose stones.

Other useful features of this combination machine are—the compactor can be operated with the grader traveling either in forward or reverse . . . the compactor can be raised for blading operations only . . . the blade can be raised for compacting operations only . . . both the grader blade and compactor can be used at one time . . . the compactor unit can easily be removed entirely to permit full grader operations. The power unit (engine and generator) for the compactor can be used as an emergency electric light generating plant or to operate small electric tools.

A NEW, MODERN WAREHOUSE-SERVICE CENTER to serve the northwestern area industry has been established by the Eutectic Welding Alloys-Northwestern Division, Inc., international manufacturers of patented Eutectic "Low Temperature Welding Alloys."

The opening of the new Warehouse-Service Center at 2712 Second Avenue, Seattle 1, Washington, was announced by Mr. Rene D. Wasserman, President of Eutectic Welding Alloys Corporation, New York.



Austin-Western 5 to 8-ton tandem roller finishes under layment for Buffalo, N. Y., overpass on New York Thruway project.

No downtime—\$50 maintenance for 3 years' rugged service from Austin-Western roller

—reports Bruner Asphalt & Construction, Inc., Buffalo, N. Y.

"We've put less than \$50 into maintenance for our 3-year-old 5 to 8-ton Austin-Western tandem roller," says General Manager George Sheperd, Bruner Asphalt & Construction, Inc., Buffalo, N. Y.

"It can be relied upon for precision compaction on every job," he tells us.

Saves trailer rental costs

"The A-W roller travels under its own power. It has enough road speed to move from job to job . . . saving us minimum trailer rental costs of at least \$40. It gets there just as fast as by trailer when you figure the time we would spend waiting for service then loading and unloading.

"It gears down nicely on the job to

smooth and steady low speeds that help assure precision compaction. It's a dependable piece of equipment, too. We haven't had any downtime. The service and cooperation we receive from our local A-W distributor are excellent."

Full line of rollers

The Austin-Western variable weight rollers are designed for finest quality compaction. They are available in 5-8, 8-12 and 10-14 tons tandem—8-11, 10-12 and 12-14 tons with 3 wheels. Also offered is a versatile 3½ to 6-ton portable tandem roller.

For full information about this popular line of rugged variable weight rollers, contact your nearby Austin-Western dealer or write us today.

Austin 1909-1959
100th YEAR
PARTNERS IN PROGRESS **Western**
CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.
BALDWIN • LIMA • HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

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Text on Landslides

*Review by Robert F. Baker,
Professor of Civil Engineering,
The Ohio State University*

A new text on landslides, covering the subject from cause to effect, is available to engineers and geologists. The book, "Landslides and Engineering Practice," has been released as Special Report 29 of the Highway Research Board. It contains the most comprehensive treatment of the landslide problem available in the English language.

A committee of engineers and geologists, under the Research Board, collaborated for five years on the preparation. Chairman E. B. Eckel, chief of the engineering geology branch, U.S. Geological Survey, edited the published version. A good cross-section of the United States and of the engineering and geology sciences were represented in the membership including:

Robert F. Baker, Professor of Civil Engineering, Ohio State University; Donald J. Belcher, director of the Cornell Center for Aerial Photographic Studies, Cornell University; Arthur B. Cleaves, professor, Department of Geology, Washington University, St. Louis, Mo.; Seward E. Horner, former chief geologist, Highway Commission of Kansas (deceased); Ta Liang, associate professor, School of Civil Engineering, Cornell University; Harry E. Marshall, geologist, Ohio department of highways; John D. McNeal, chief geologist, Highway Commission of Kansas; Shaler S. Philbrick, division geologist, Corps of Engineers, U.S. Army, Pittsburgh, Pa.; Arthur M. Ritchie, geologist, Washington department of highways; Arthur W. Root, supervising materials and research engineer, California division of highways; Rockwell Smith, roadway engineer, Association of American Railroads, Chicago; David J. Varnes, geologist, Engineering Geology Branch, U.S. Geological Survey, Denver; W. A. Warrick,

resident manager for John Clarkson, consulting engineer, Albany, N.Y.; E. J. Yoder, associate professor of highway engineering, Purdue University.

The text defines landslides as "downward and outward movement of slope-forming materials composed of natural rock, soils, artificial fills, or combinations thereof." Excluded are problems related to subsidence, pure settlement, or embankment foundation failures on soft ground in essentially flat terrain. The text is slanted toward highways, but most of the material need not be restricted to application to highway problems. In Part I, the economic and legal implications are discussed as well as the geologic factors associated with the description of the phenomena. Part II deals with prevention and correction. Both empirical and theoretical considerations are included.

A new and simpler classification system for landslides is proposed based upon the mechanics of movements. Three basic types of earth movement are recognized: *falls*, *slides*, and *flows*. The principal subdivision of the three main types is concerned with strength properties; i.e. whether bedrock or soil is involved in the movement. Factors that contribute to landslides are presented in a logical manner so as to indicate (1) the increase of the forces tending to cause movement or (2) the reduction of the forces resisting motion.

● Recognition features and the use of airphotos are presented in sufficient detail to permit identification of existing as well as potential landslide areas. Procedures for conducting field investigations and laboratory studies are suggested for the various types of landslides and engineering problems encountered. Consideration is given to the economics of such studies as influenced by the size of the landslide, and the degree of importance of the highway or structure.

Extensive coverage, nearly half the volume, is directed to prevention and correction, with numerous case histories utilized to describe the applications. Prevention is underscored as a much more economical solution in most cases than correcting the difficulties after movement has been initiated. While recognition of potential slope problems is difficult, more rigorous study and analysis are recommended in order to permit the employment of good preventive techniques without risk of "preventing" a failure that would not have occurred. Methods are given for obtaining a proper understanding of the geology of the area and past history of the slope with reference to the degree of instability.

● Correcting an existing landslide is discussed as allowing for more precise analysis but, due to financial limitations, quite frequently the corrective utilized is inadequate. The text states that several types of corrections exist for a given landslide, and the problem is to find the one that is the most economical on a long term basis. The last requirement makes a quantitative analysis quite desirable, particularly for major problems.

The text is designed for professional use, and advanced geologic and soil mechanics terminology and methods are incorporated. Ultimate value will be derived by those with a good background in both geology and soils engineering.

"Landslides and Engineering Practice" is available from the Highway Research Board, 2101 Constitution Avenue, Washington, D.C., at a cost of \$6.00.

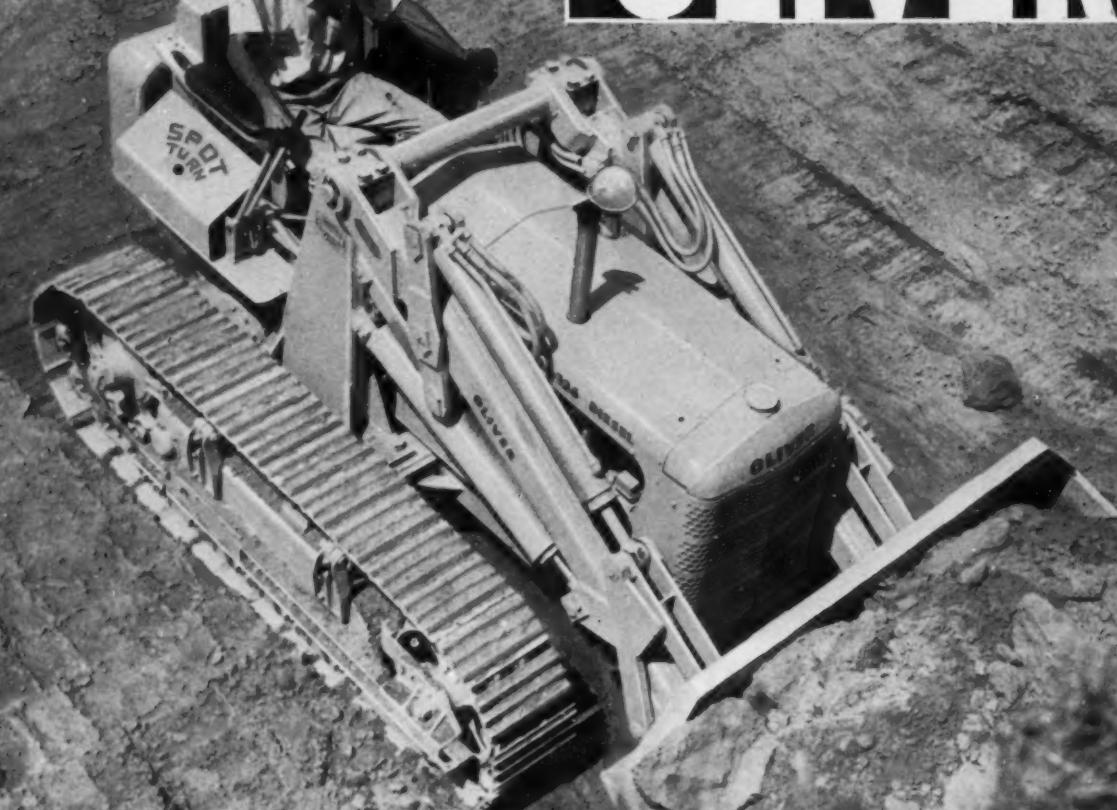
Soil-Cement Awards

In 1958 soil-cement awards in the United States and Canada totaled 48.6 million sq. yd., a rise of 78 percent over 1957, according to statistics by the Portland Cement Association.

Yardage awarded has been more than doubling during every 5-year period since 1943, the Association stated, and in the last few years the rate of increase has greatly accelerated. Total soil-cement awards for 1958 were more than four times greater than those for 1948.

The major application of soil-cement, a tightly compacted mixture of soil, portland cement and water, has been as a base course for road and street pavements. Other uses include pavement for shoulders, parking lots, storage areas and small airports.

OLIVER



"SPOT-TURN" PUTS STEERING AND STOPPING NEATLY IN HAND!

Now Oliver puts the *full* tractor operation conveniently in the palms of your hands—for the simplest, safest, most responsive clutch steering method of all. Say goodby to the slam-bang of foot braking—the tired feet! With Oliver "Spot-Turn" steering, just a touch of the hand lever gives you pivot or gradual turns...or complete about-face. Stopping is just as simplified. Pull back the two levers—track power cuts off; brakes ease on. Yet, *full* power is still available to break out, lift or dump!

The Oliver OC-126 is the most obedient of all $1\frac{1}{2}$ -yd. crawler loaders. It maneuvers precisely as

the job calls for—exactly as the operator wants. Speed is your reward—the most rapid digging-loading cycle you've ever seen in a crawler tractor. Choice of high-torque gasoline or diesel power, and the front- and rear-mounted equipment you need.

For all this, the Oliver OC-126 with diesel power is priced actually hundreds of dollars under other tractors its size. See the Oliver OC-126 at your Oliver distributor's now.



THE OLIVER CORPORATION

Industrial Division, 19300 Euclid Ave., Cleveland 17, Ohio

a complete line of industrial wheel and crawler tractors and matched allied equipment

Ask your Allis-Chalmers dealer to show you "And a Great Deal More"



SINGLE-LEVER speed and direction control makes it easy for operator to work fast

If a loader operator has to move one lever for forward and reverse, and another lever to get into a higher working gear, chances are he's going to stay in low gear.

Recognizing these limitations on your achieving faster loading, Tractomotive developed Single-Lever speed and direction control to speed up the work cycle. It's on both the big TL-20 TRACTOLOADER*, and the slightly smaller TL-16.

With Single-Lever control, the operator will naturally choose his fast-

est possible working gear every time he shifts. He can go into second gear just as easily as first—and get there on the double. Moreover, when there's loading to be done down the road or across the pit, he power-shifts right into high (road speed), and does the job in a hurry.

Let your Allis-Chalmers dealer show you how this exclusive One-Lever control of speed and direction alone will add many extra yards to your daily production.

Other TL-20 and TL-16 working

advantages include: Longer Reach; Strong, Pin-Connected Planetary Axles; Extra Stability; Safe Dump Cylinder Location; Extra Hydraulic Protection; Hydraulic Torque Converter Drive; Tip-Back Bucket; "Hi-Traction" Differentials; Power Steering; Ignition Key-Type Starting; 4-Wheel Power Brakes; 6-Way Adjustable Seat; Rear-Axle Disconnect; Bucket Position Indicator.

*TRACTOLOADER is a registered Tractomotive trademark.

ALL TRACTOMOTIVE EQUIPMENT IS SOLD AND SERVICED BY YOUR ALLIS-CHALMERS DEALER

TRACTO—
a sure sign
of modern design

TRACTOLOADERS • TRACTOSHOVELS • TRACTORIPPERS • TRACTOHOES • TRACTOSIDEBOOMS

... for more details circle 367 on enclosed return postal card

T40

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION • DEERFIELD, ILLINOIS



ROADS AND STREETS, April, 1959

New Products

Reader Service Numbers on Enclosed Postcard

To readers outside of the United States—Sorry, postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, Ill., U.S.A.

Portable Maintenance Shop

A new low-cost all-steel portable maintenance building, announced by Stran-Steel, is designed for erection by an unskilled crew. The "Stran-Master", comes in a wide range of widths from 12 ft. to 120

unit and the attachments when moving from job to job.

During operation, the tractor becomes, in effect, a power steering axle for the tractor-trailer combination. It is attached to the trailer by the fifth wheel kingpin and also by hydraulic rams which, through their movement, provide a positive



"Stran-Master" Portable Maintenance Building.

ft. No cranes or heavy equipment are needed for erection. There are no nails or spikes to be driven; all framing connections are made through factory-drilled holes for bolting.

Stran-Steel Corporation, Division of National Steel Corp., Detroit 29, Mich.

For more details circle 101 on Enclosed Return Postal Card.

Road Widener

A new Model SJ-50 road widener, announced by Barber-Greene, is stated to offer a completely new concept in solving major problems of road widener design and operation.

The SJ-50 consists, basically, of two units; a tractor and a trailer, connected by a conventional fifth-wheel arrangement. The tractor includes operator's deck; power unit, drive wheels, the receiving hopper and discharge conveyor. The trailer, which is equipped with its own jib-hoist, supports the widening attachments during operation and also serves to transport the tractor

steering force and give the operator finger-tip control of steering. Since the weight of the laying attachments is borne by the trailer's jib



Barber-Greene's New Model SJ-50 Road Widener

hoist, complete steering control is assured, even under severe side drag conditions.

Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill.

For more details circle 102 on Enclosed Return Postal Card.

75-HP Wheel Tractor

The new International 660 wheel tractor is now coming off the production lines, with an estimated 75 hp at the belt and 68 hp at the drawbar, the machine is powered by a 6-cylinder valve-in-head gasoline engine.

It is stated that the tractor can pull sheepfoot rollers equivalent to those used with a crawler tractor of the 100-drawbar horsepower class. It is built to work with a $\frac{3}{4}$ -cubic-yard International Wagner front-end loader, and will be equipped with International Wagner and Pippin backhoes with $1\frac{1}{2}$ foot working depth.

Four models of the Johnson elevating scraper, with 4 to 8 cu. yd. capacities, are designed to work with the International 660. These scrapers feature a power take-off driven elevator, which conveys all material to the scraper bowl, and is stated to use only one-fourth of the power required to load conventional scrapers of the same cubic yard capacity.

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

For more details circle 103 on Enclosed Return Postal Card.

Carburetor Cleaner

The manufacturer of "Gumout" carburetor cleaner announces that it is now packed in modern, tamper-proof, factory-sealed one-pint cans. The new package replaces the old-fashioned screw-top cans previously used.

Gumout Division, Pennsylvania Refining Co., 2686 Liston Road, Cleveland 4, Ohio.

For more details circle 104 on Enclosed Return Postal Card.

Ballast for Fluorescent Lights

A new ballast for PG, VHO and SHO fluorescent lighting in commercial and industrial applications that is cooler, quieter and nearly 7 lbs. lighter than present two-section models has been introduced by General Electric's Ballast Department. Designated 6G1200, the new single-case ballast for 120-volt operation of two 72 or 96-inch power groove, VHO or SHO lamps has an 18½" mounting dimen-

sion and eliminates the need for mounting and interconnecting two separate sections. Units give reliable starting of 72" lamps down to -20 F and 96" lamps down to -50 F according to company engineers.

General Electric Co., Schenectady 5, N. Y.

For more details circle 105 on Enclosed Return Postal Card.

Bridge Protective Coating

The New York State Thruway Authority is evaluating a new rubber sealant material for protecting bridges on the thruway from deteriorating in the wintertime. The preparation, a mixture of rubber, resin, and solvent developed by The Firestone Tire & Rubber Co., can be applied directly to the concrete bridge paving with a squeegee.



Applying "Rub-R-Road Compound" to Bridge Near Albany, N. Y.

The sealant is called "Rub-R-Road Compound". Approximately two parts are mixed in an ordinary cement mixer with one part of abrasive aggregate, then poured into the pavement from barrows.

The Firestone Tire & Rubber Co., Akron 17, Ohio.

For more details circle 106 on Enclosed Return Postal Card.

New Pulverizer

Low power consumption is a major claim of the manufacturer for the new "Barlett-Snow Cycle" swing-hammer pulverizer which crushes almost entirely by impact. Economy—both of operation and first cost—plus the small size of these pulverizers—adapt them especially for crushing materials between 10 and 40-mesh size at rates up to 10 tons per hour. They are used for reducing limestone, gypsum, soda ash, slate, shale, cinders, and similar crystalline and friable materials.

High-speed rotation of the hammers pounds incoming solids against a series of hardened breaker blocks, thus effecting most of the crushing. Material reduced to proper mesh is discharged through a bottom screen and oversize material is swept up by the hammers and further reduced against the breaker blocks. Hammer clearances avoid attrition of the material and resulting

designed WITH CONCRETE IN MIND

GAR-BRO POWER-CARTS *move concrete faster!*



SAVE SECONDS
in each operation

SAVE MINUTES
each round trip

SAVE HOURS
of productive time

Moving concrete faster at a low cost is the purpose of the Gar-Bro Power-cart. That is why it is the *fastest* and, at the same time, the lowest priced motorized concrete cart on the market. It is lowest in operating cost and lowest in maintenance cost as well.

Let your Gar-Bro dealer demonstrate why Gar-Bro Power-carts are best. Phone him today or write for catalog.

**GAR-BRO MANUFACTURING CO., Los Angeles, Calif. • Peoria, Illinois
General Offices: 2415 East Washington Blvd., Los Angeles 21, Calif.**

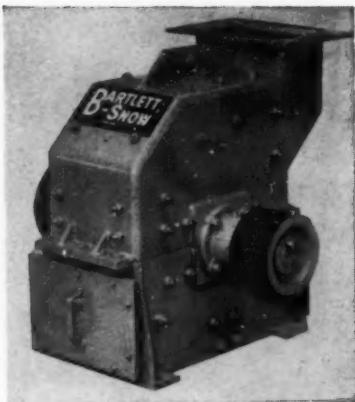
GAR-BRO

CONCRETE
HANDLING
EQUIPMENT



THE WORLD'S MOST COMPLETE LINE

... for more details circle 319 on enclosed return postal card



The Bartlett & Snow New Swing-Hammer Pulverizer

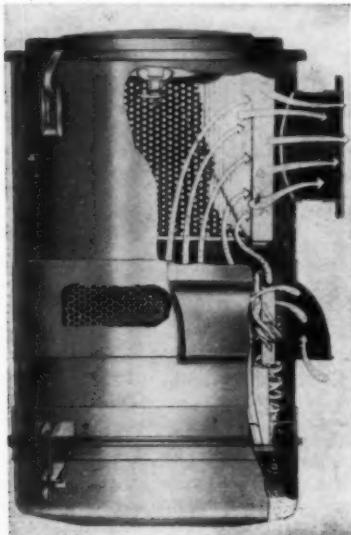
fines which cause excessive wear. Housings are welded steel, combining ruggedness, lightweight, and economy. The three machine sizes have capacities from 1 to 10 tons per hour. Power requirements range from 5 to 20 hp.

The C. O. Bartlett & Snow Co., 6200 Harvard Ave., Cleveland 5, Ohio.

For more details circle 107 on Enclosed Return Postal Card.

Dry Air Cleaner

The currently announced "Donaclone Duo-Dry" air cleaner operates in two dry cleaning stages. No oil is required. The primary stage which removes up to 98% of the dirt, is made up of a cluster of "Donaclone tubes," each of which is a centrifugal cleaner with a maximum capacity of 10 cu. ft. of air per minute. The air requirement of the engine, therefore, determines the number of tubes in the cleaner.



Diagrammatic cross section of "Donaclone" air cleaner. Centrifugal cleaning stage at bottom; paper filter at top.

and this number is as high as 113, in sizes now being manufactured. Dust trapped by the centrifugal cleaning stage drops into a removable dust cup.

The secondary cleaning stage is a paper filter of improved design. Called the "Duralife," made of a special chemically treated paper which combines structural rigidity with resistance to oil and water. It approaches 100% as a barrier to dust particles.

This 2-stage principle provides the efficiency of paper filter cleaning without any sacrifice of service life. The life of a paper filter alone, even under light dust conditions is too short to make such a cleaner practical. The "Donaclone's" primary cleaning stage, leaves only 2% to be taken out by the paper filter. Servicing cost is a minimum; the operator simply removes the dust cup, empties it out on the ground and replaces the cup, a 2-minute operation. At infrequent intervals, the paper filter should be cleaned with compressed air.

Donaldson Company, Inc., 666 Pelham Blvd., St. Paul 14, Minn.

For more details circle 108 on Enclosed Return Postal Card.

Chemical Brush Control

A new approach to chemical control of woody brush is offered in a pelleted formulation of fenuron, one of the new substituted-urea herbicides recently introduced by the Du Pont Company under the name "Dybar". When the pellets are scattered over brush-infested areas, they are stated to give positive brush control with one low-cost treatment. Ease of application gives the pellets an important advantage. Being nonvolatile, the pellets can be used near sensitive crops, and they are non-corrosive, nonflammable, and present no toxicity hazard to people or animals when used as directed.

E. I. DuPont De Nemours & Co., Wilmington, Del.

For more details circle 109 on Enclosed Return Postal Card.

Brush Cutter

A heavy-duty rotary cutter for land clearing, mulching and right of way maintenance has been announced by W. F. Covington Planter Co. Exclusive design-feature is a 70-lb. shielded flywheel, which not only delivers a steady flow of power to the blades but also enables the cutter to ride easily over obstacles with no interruption of cutting action. This feature was successfully tested in underbrush with trees up to 4 in. in diameter by Dorsey Trailers, from whom Covington purchased all manufacturing rights.

W. F. Covington Planter Co., Dothan, Ala.

For more details circle 110 on Enclosed Return Postal Card.

Horizontal Auger Drill

A new horizontal auger drill, announced by J. R. Prewitt & Sons, Inc. is designed for drilling under streets, railroad tracks and highways. Auger extensions are available in diameters



Prewitt Horizontal Drill

from 2½ in. to 20 in. in 4-ft lengths. The drill holds straight line up to 100 feet, with limited size augers, according to manufacturer. Easily reversed for retracting augers. Powered by your choice of power unit.

Prewitt & Sons, Inc., Dept. SE, Pleasant Hill, Mo.

For more details circle 111 on Enclosed Return Postal Card.

Drafting Table

A new Stacor-Univac drafting table, announced by Stacor Equipment Co., is stated to be balanced perfectly in any position by a counterweight mechanism, operated by front pedals. It's



New Stacor-Univac Drafting Table

large range of movement permits a draftsman to work comfortably on any part of the board either standing or sitting.

Stacor Equipment Co., 285 Emmet St., Newark 5, N. J.

For more details circle 112 on Enclosed Return Postal Card.

Self Propelled Power Broom

A new self propelled power broom, the "Broom-Master", announced by Flaherty Mfg., Inc. has a built-in blower powered by a V-belt drive from the tractor's constant running power take-off. It applies a full broom width jet air stream at the right place. A



Flaherty Broom Master

unique design feature allows the blower to be held in the desired position as adjustment is made to compensate for broom core wear. A jaw clutch permits independent operation of the broom from blower.

Flaherty Mfg. Inc., P.O. Box 1042, Pocatello, Idaho.

For more details circle 113 on Enclosed Return Postal Card.

Highway Guard Post

A new highway guard post is now in production by Plyacon, Inc. It is claimed the posts, set in a series of two or three flexible barriers, have repeatedly stopped cars traveling as fast as 60 mph in approximately 32 feet. The



Installation at Railroad Underpass.

unit consists of a special Butyl compound circular post 3 ft. 6 in. long with 10 in. diameter. A steel base mounting is inserted in the Butyl core and extends below the pavement or divider strip surface.

Plyacon, Inc., 48 Westwood, Toledo 7, O.

For more details circle 114 on Enclosed Return Postal Card.

Clay Digger

A new Thor No. 10 CD clay digger, an easy handling 27-lb. Air powered tool, is designed especially for tunnel spading and other heavy-duty digging. It is 23 1/4 in. long overall, with standard chuck 1/4 in. sq. x 2 1/4 in. and optional chuck 7/8 in. Hex. x 3 1/4 in.

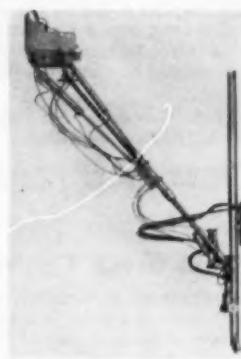
Hose size is Thor 1/2 in. and the air inlet, with swivel hose connector to prevent kinking, has 3/8 in. male pipe thread.

Thor Power Tool Co., 175 N. State St., Aurora, Ill.

For more details circle 115 on Enclosed Return Postal Card.

Hydraulic Jumbo Arm

A new hydraulic jumbo arm claimed to provide greater flexibility of drilling, more rapid positioning and more accurate hole spacing has been placed on the market by Le Roi. The LJB arm is available in three lengths, with 4-ft. telescopic extensions offered in two lengths. It can be mounted on drill jumbos, crawler tractors, or truck



LJB Hydraulic Jumbo

platforms. Controls can be mounted on either side of the arm or on the pedestal. Double acting hydraulic cylinders quickly extend, retract, swing and elevate jumbo arm. The air motor operated hydraulic pump is governed to maintain constant pressure at all times. A safety valve in lift cylinder prevents arm from falling if hose or hydraulic system fail.

Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wis.

For more details circle 116 on Enclosed Return Postal Card.

Line Marker

A new Model 9000 heavy duty line marker, announced by Unimasco, Inc., is claimed to have the versatility of small machines and the capabilities of large truck mounted units. Available in varying capacities from 10 to 120 gal., this machine is propelled like an automobile, and has a forward and reverse gear. It is stated, to be capable of painting from 3 to 6 miles per hour and of operating from one to three spray guns simultaneously. Equipped with the many fine features necessary for efficient operation of line marking equipment. Also capable of painting one or two colors. The spray guns are air-actuated, and are also of new design. Large fluid openings prevent the guns from plugging even with premix



Model 9000 Line Marker

compound or other thick bodied traffic paints. Easily adjustable for different speeds of application.

Unimasco, Incorporated, 427 W. Redondo Beach Blvd., Garden, Calif.

For more details circle 117 on Enclosed Return Postal Card.

Hydraulic-Power Outriggers

A new type of hydraulic-power outriggers, which take only 76 seconds to adjust from travel to ready-to-work position, is now available on Lorain Moto-Cranes. For "on-the-job" move-up of equipment using the outriggers, it takes just 40 seconds to retract and set outriggers, the manufacturer reports.

The quick adjustment of the Lorain "Power-Set" outriggers is made possible by a patented Lorain exclusive con-



sisting of four curved outrigger beams. These are arranged in two sets of two side-by-side beams in the outrigger boxes. Each beam is actuated in two directions by a double-acting hydraulic cylinder. The oscillating float at the end of each beam is moved both out and down simultaneously, at a two-to-one ratio, thus combining the two required motions.

The Thew Shovel Co., Lorain, Ohio

For more details circle 118 on Enclosed Return Postal Card.

Curb Laying Machine

A new self-propelled MC-500 "curbiller" has been announced by Miller Spreader Corporation. Four bolts provide a fast, easy interchange of the compaction chamber from right to left for laying curb from either side at from 2500 to 3000 feet per day. The hopper is easily reversible by loosening two wing-nuts. The whole changeover to right or left can be done in 8 minutes.



Miller MC-500 "Curbilder"

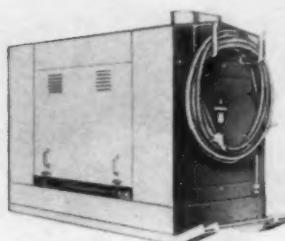
utes. New centrifugal clutch and kick-out torque bar provide exclusive safety features, saving damage to screw and mechanism. Wheels adjust to right or left, up, down, forward or trailing positions, preventing trailing in tack coat—allowing smoother operation. Curb can be laid even in a complete circle.

Miller Spreader Corp., 4020 Simon Road, Youngstown 12, Ohio.

For more details circle 119 on Enclosed Return Postal Card.

500-Gal. Steam Cleaner

A new steam cleaner with 500 gal. capacity introduced by Vapor Heating Corp. is designed to handle such jobs as removing clay, mud, snow, ice from trucks and construction machinery, degreasing and cleaning rolling stock of all kinds, paint-stripping and cleaning bridges and structures, cleaning and



Upgrader Intermediate Steam Cleaner

servicing aircraft, and many other uses. Steam generated by the boiler is combined with cold water in an injector. The steam both heats the water and forces it through the hose and cleaning lance at 250 psi, double the original steam pressure.

Vapor Heating Corporation, 80 E. Jackson Boulevard, Chicago 7, Ill.

For more details circle 120 on Enclosed Return Postal Card.

Melting Kettles

The "E-Z-Loader" kettle for contractors, roofers, road builders, and pipe liners combines efficiency and durability. Designed with internal tube heating system, it provides lower loading, melts faster and more safely without overheating, and is said to be more economical in fuel, easier to maintain, and longer lasting.

Insulation of 1½ in. fiberglass usually keeps melted material hot overnight. Built-in heat riser speeds morning melt in a cold kettle by releasing the pressure of hot gas and liquid that develops

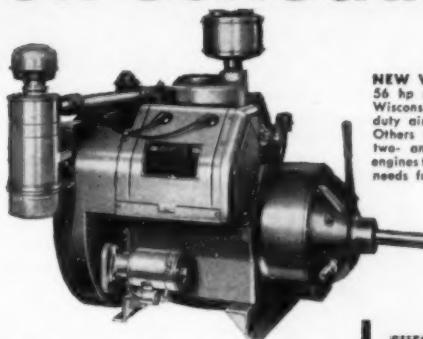
around the tube areas. The arched cover is fitted with a vent to prevent pressure build-up and with an easy-open, easy-close dog latch.

Kerosene-burning kettles are furnished with steel fuel tank with a built-in 2-in. hand pump and a large hand-tight filler plug. L-P gas burning kettles are available with either vapor service torches, or liquid service torches which draw liquid gas from the bottom of the gas cylinder and vaporize it at the torch.

Trailer type kettles on pneumatic tires are available in 60, 90, 120, 180, 240 and 360-gal melting capacities. Skid

Here's why WISCONSIN ENGINES keep your construction jobs

"on schedule"!



NEW VR4D 4-cylinder 56 hp model tops the Wisconsin line of heavy-duty air-cooled engines. Others include single-, two- and V-type 4 cyl. engines to meet all power needs from 3 to 56 hp.

"plus" features assure full-time power in any climate!

The overwhelming acceptance by builders and users of Wisconsin-powered construction equipment, backed by cost-cutting field service records, prove that Wisconsin heavy-duty air-cooled engines rate first in performance and low-cost maintenance.

These rough-and-ready engines never say "die." They give you load-holding lugging power that slugs through sudden shock loads. Air-cooling design cuts weight and maintenance—delivers the most power per pound of engine weight. Quality construction assures long, trouble-free service—plus fast starts and dependable power round-the-clock in any climate!

Equally important—there's an authorized Wisconsin service station wherever you may be, to help you if and when you need parts or service. Write for complete service station directory S-198—and product Bulletin S-237.

CHECK THESE WISCONSIN DESIGN FEATURES:

FORGED STEEL CRANK-SHAFT with tapered roller main bearings permits power takeoff direct from the shaft.

LARGE-CAPACITY FAN integrally cast with fly-wheel provides correct heat dissipation at temperatures from sub-zero to 140°F.

HIGH TENSION OUT-SIDE MAGNETO with impulse coupling delivers fast starts at all times.

FULL LUBRICATION is provided by pump-circulated lubrication system, assuring top performance with less care.

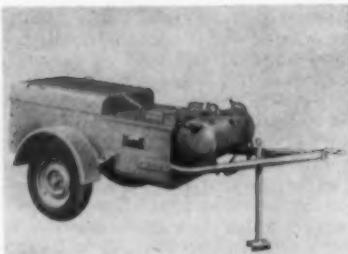
SPECIAL EQUIPMENT available includes electric starting, LPG carburetion, etc.



WISCONSIN MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN

World's Largest Builders of Heavy-Duty Air-Cooled Engines

... for more details circle 374 on enclosed return postal card



The "E-Z-Loader" Kettle for Tar, Asphalt, Pitch, or Bituminous Compounds.

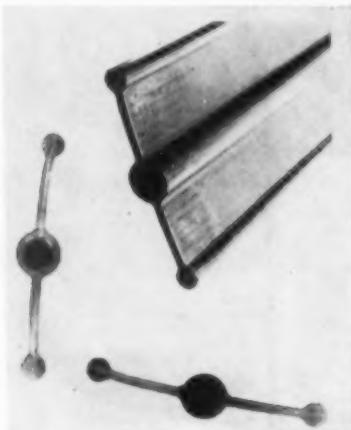
type kettles are made in 50, 90 and 120 gal capacities.

Hauke Manufacturing Co., 124-36 Tenth St., Brooklyn 15, N.Y.

For more details circle 121 on Enclosed Return Postal Card.

Rubber Waterstop

A new rubber waterstop, claimed to provide absolute watertightness under hydrostatic pressure in concrete expansion, contraction and construction joints, has been announced by Prestite-Keystone Engineering Products Co. Known as "Aquastop", it has been engineered in both material and design to withstand the contraction, expansion and shearing movements of modern concrete construction. For example, one of the Aquastop designs avail-



Aquastop, New Rubber Waterstop

able (Centerbulb Type 9" size) is stated to withstand a 5" deformation created by lateral contraction or shearing action, and continue to provide absolute watertightness in the joint even under hydrostatic pressure.

Prestite-Keystone Engineering Products Co., 39th and Chouteau Aves., St. Louis 10, Mo.

For more details circle 122 on Enclosed Return Postal Card.

New Boom for Power Loader

A hydraulically powered jib boom designed for the Daybrook power loader provides greater flexibility of use, more speed, and the ability to handle heavy bulky materials with precision accuracy where space limitations exist. It utilizes the same hydraulic system as the standard Daybrook power loader, less the winch and cable. Load capacities range to 7,000 lb maximum for loading a platform truck or for unloading and placing materials at elevated



The Daybrook Jib Boom Power Loader

places or at ground or floor level. The boom has full 360° rotation.

The jib boom series will be known as PL6J with Model PL6JST having manual control and Model PL6JRC equipped with remote control. The latter permits the operator to take position at the end of the boom to help guide the load as well as operate the power loader. Special boom fixtures or attachments are easily adapted to handle specific materials or do special jobs.

Daybrook Hydraulic Division, Young Spring & Wire Corp., Bowling Green, Ohio.

For more details circle 123 on Enclosed Return Postal Card.

Aggregate Spreader

A new positive feed aggregate spreader, announced by Highway Equipment Co., controls material flow in either forward or reverse.

Designed particularly for seal coating, this Hi-Way Model "R" spreader is being made in six standard sizes which spread in widths from 8 to 13 feet. Fully interchangeable with different dumpbodies, the Model "R" handles all aggregate from sand to crushed rock for seal coating. Among its features are a feedgate which follows a true arc when opening or closing, thus eliminating the wasteful free flow of material; a single shift, three-position lever which controls the agitator and feed roller and which returns automatically to neutral in the event of a



Hi-Way Model "R" Spreader.

shifting error; adjustable feedgate levers, mounted at both ends of the spreader to permit tapered spreading.

Highway Equipment Co., Dept. H55-2, 616 D Ave., N.W. Cedar Rapids, Iowa.

For more details circle 124 on Enclosed Return Postal Card.

Gear Shifting Control

A new, air-actuated gear shifting control unit for the 10-speed Fuller Road-Ranger transmissions has been announced. Called "Fullair Control", the unit consists of a small master control which replaces the conventional gear shift lever or corresponding part of a mechanically actuated remote control. Movement of the short shift lever of



New Fuller Control.

the master control through the normal shift pattern identified on a slotted template actuates air valves, which in turn release compressed air to a slave unit on the transmission to activate power cylinders to select and engage the particular gear combination required by the driver.

Fuller Manufacturing Co., Transmission Division, Kalamazoo, Mich.

For more details circle 125 on Enclosed Return Postal Card.

Electric Erasing Machine

A new precision constructed hollow shaft electric erasing machine, announced by Charles Bruning Co., has been carefully designed to provide engineers and draftsmen with added erasing comfort and greater operating efficiency. The easy-to-hold unit features a non-slip gripping surface. A



Bruning Electric ERaser Model 3831

tapered, pencil-like shank permits easy manipulation in close quarters and relaxed gripping. Slight index-finger pressure on a sensitive switch sets the eraser in operation at 3100 rpm.

Charles Bruning Co., Inc., Mount Prospect, Ill.

For more details circle 126 on
Enclosed Return Postal Card.

Air Chucks Prevent Leakage

Eight new models in its line of air chucks for off-the-road equipment have been announced by Dill Manufacturing Co. Made to withstand continual abuse, these air chucks are claimed to insure against costly leakage at the air lines.

Dill Manufacturing Co., 700 East 82nd St., Cleveland 3, Ohio.

For more details circle 127 on
Enclosed Return Postal Card.

Poison Oak and Ivy Remedies

"Imuniv" and "Imunoak" are standardized non-toxic alcoholic extracts of poison ivy or poison oak. When taken as directed they will eliminate or reduce substantially the incidence of poison ivy or poison oak, according to the manufacturer.

E. D. Bullard Co., 2680 Bridgewater, Sausalito, Calif.

For more details circle 128 on
Enclosed Return Postal Card.



BRUNSON TRANSITS go to extremes to prove **LASTING ACCURACY**

Only instruments of
Brunson design could
weather temperatures from -70° to +160°, withstand
350 days of punishing dust bombardment!

In severe tests and in years of the hardest field service,
Brunson instruments have proved their lasting accuracy
and operability under extreme conditions. The reason:
Brunson's unique ball bearing construction!

Located in the spindle and telescope axis, Brunson ball
bearings are permanently lubricated by an all-temperature
lubricant and sealed against moisture and dust. Wear is
practically eliminated. Preloaded and accurate to 5-millionths
of an inch, these bearings provide highest possible
instrument accuracy.

Brunson ball bearing construction costs you no more —
offers much more in accurate, trouble-free performance.
Why not mail the coupon, right now?



Charles Bruning Company, Inc., Dept. 4-GG
1800 Central Rd., Mount Prospect, Illinois
Offices in Principal U.S. Cities
In Canada: 105 Church St., Toronto 1, Ont.

Please send me more information on Brunson surveying
instruments.

Name _____ Title _____

Company _____

Address _____

City _____ County _____ State _____

... for more details circle 289 on enclosed return postal card

New Attachments for Push-Trac

Shawnee Manufacturing Co. has taken over the manufacture and sales of the Push-Trac tractor, formerly made by Aroo Iron Works, Inc. In introducing the Push-Trac as part of its light industrial line, Shawnee has added a new attachment and has redesigned one other. The new item is a



Push-Trac with Dump Cart Attached.

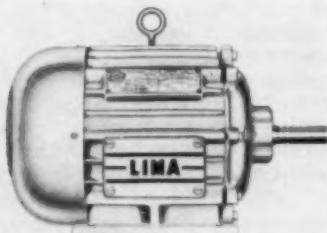
1,000 lb. capacity dump cart, which is balanced for easy control and is completely self-unloading. Redesigned, the snow plow attachment which is now made into a heavy duty powered snow auger. Additional attachments for the Push-Trac are on the drawing board.

Shawnee Mfg. Co., Inc., 1947 N. Topeka, Topeka, Kan.

For more details circle 129 on Enclosed Return Postal Card.

Fan-Cooled Electric Motors

A line of new rated Nema Type E, totally enclosed, fan-cooled electric motors has been announced by The Lima Electric Motor Co. They are for use in non-explosive atmospheres contain-



Lima Type E. Motor

ing excessive moisture or abnormal quantities of dirt, metallic dust or other abrasives. Lima Type E motors are available from 1 hp, 900 rpm, (Frame 213) through 40 hp, 3600 rpm (Frame 326 U).

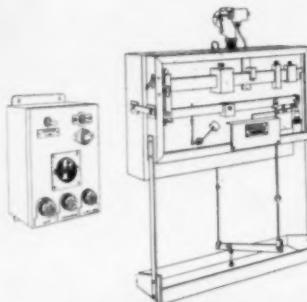
The Lima Electric Motor Co., Inc., Dept. 253, Lima, Ohio.

For more details circle 130 on Enclosed Return Postal Card.

Calcium Chloride Batcher

A calcium chloride weigh batcher, designed to simplify the addition of a standard solution of calcium chloride to concrete mixes at batch plants, has been introduced by C. S. Johnson. Capacity is ample for a 3½-yd batch with 2% calcium chloride or a 7½-yd batch with 1% of the solution. Figures apply even when up to 7 sacks of cement per yard are used.

This is how the batcher works: with the weighbeam set to the weight of the cement in the batch and the ready-to-



The new C. S. Johnson Calcium Chloride Weigh Batcher has a capacity ample for adding 2% standard solution for a 3½-cu yd batch. All control switches and indicator lights are grouped on the remote control box, shown right.

batch light on, the operator turns the switch to "batch." While the present quantity of calcium chloride solution is filling the hopper, he weighs up other materials. When a ready-to-discharge light comes on to indicate that the solution has been shut off and that the correct amount of solution is in the hopper, operator turns the switch to "discharge." Once the hopper is empty of the solution, the ready-to-batch light shows again.

C. S. Johnson Co., Subsidiary of Koehring Co., Champaign, Ill. and Stockton, Calif.

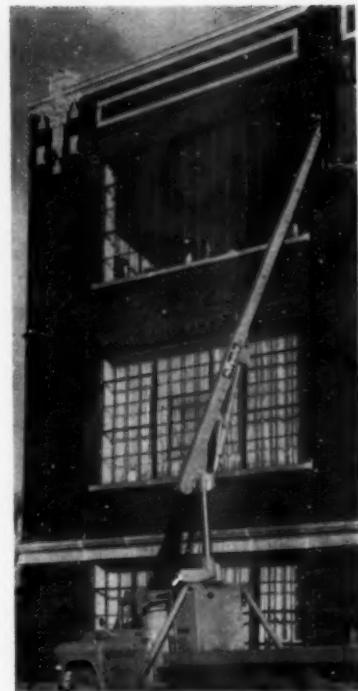
For more details circle 131 on Enclosed Return Postal Card.

Crane of Many Uses

The "Versa-Lift" fully hydraulic, truck-mounted crane, here pictured with an aerial worker basket, is an efficient loading, transporting, and unloading unit for materials and equipment items. In the case of water or sewer pipe, it uploads directly into position in the trench. The mounting requires only 22½-in. of truck platform space.

The aerial basket is of fiberglass of high voltage resistance. It is removable in minutes, but since it does not interfere with other operations, it is frequently left in place during other work. Remote controls and other accessories are available.

The crane has lifting capacities of



The "Versa-Lift" with Aerial Basket

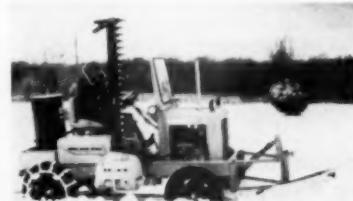
7,000 lb at 8-ft, 3,500 lb at 16-ft, and works in a full 360° circle. It will place loads 30 ft up, 16 ft below the ground, and reach out from 16 to 22 ft. It is distinctly a multi-purpose unit adaptable to municipal jobs in various departments.

Teale and Company, Box 308, Omaha, Nebr.

For more details circle 132 on Enclosed Return Postal Card.

Angle Dozer Attachment

An angle dozer attachment has been added to the Topeka "Forty Mile Mower" for use in snow removal operations. The dozer angles 30 degrees right or left or in a straight dozer position. The blade is 72" wide, with



Topeka Mower with Dozer Attachment

replaceable cutting edge. It is hydraulically raised and lowered and has a 14" clearance in maximum raised position.

Topeka Highway Mower, Inc., 625 East 7th St., Topeka, Kan.

For more details circle 133 on Enclosed Return Postal Card.

New Ford Units

Five new products for industrial and other non-farm materials handling and earth moving jobs are announced by Ford Motor Co. Included are a new rear-mounted reversible scoop, 6 and 7-ft universal dozer blades, (with optional blade angle adapter and spring release to avoid impact damage) a new Dearborn scraper, landscapers and "earthcavators."

The scoop attaches to the rear three-point implement linkage of any Ford tractor and carries up to ten cu ft of



"Dearborn earthcavator" of 65 and 72-in. width for use with Ford tractors. An 80-in. model is available for the Fordson Power Major Diesel tractors. These "earthcavators" can be rotated to 3 positions: grade, scarify or backfill. The rotation of the scraper is controlled by a lever easily reached from the tractor seat.

earth or other material. It is adapted to the largest and most powerful Ford tractors. The implement has 6-in. digging depth and 8-in. dump height clearance and can be reversed.

Two new attachments to be used in conjunction with the dozer blades are a blade angle adapter which permits the blade to be kept straight or angled to any of three positions, right or left.

The scarifying teeth of the economy scraper are individually adjustable, while the teeth on the landscapers are controlled by a lever from the tractor seat. The landscapers can scarify and blade in one operation.

Tractor and Implement Division, Ford Motor Co., Birmingham, Mich.

For more details circle 134 on Enclosed Return Postal Card.

Rust-Oleum Spray Can

A new "self-spray" can has been introduced by Rust-Oleum Corp. for the convenient application of its rust preventive coatings. Sixteen colors and a clear transparent seal are available.

Rust-Oleum Corp., 2799 Oakton St., Evanston, Illinois.

For more details circle 135 on Enclosed Return Postal Card.

Shoulder Spreader

The new ULMac U-500 Shoulder spreader, announced by ULMac Equipment Co., attaches quickly and easily to any Caterpillar No. 12 or No. 112 motor grader.

It is stated that spreads to 12 feet can be made easily and accurately with any spreadable material including hot mix. A new, scientifically curved blade for "live rolling action", mixes and



ULMac U-500 Shoulder Spreader

rolls material out, minimizing segregation and reducing side draft. The blade is made up in three sections, allowing full variation of spread width to 12 feet. Wider spread arrangements are available on request. It is stated that depth of spreads can be adjusted from 6" above to 18" below pavement level.

ULMac Equipment Co., Elgin, Ill.

For more details circle 136 on Enclosed Return Postal Card.



IGLOO...

rugged as the men who use them

IGLOO leads in water cooler sales because it's stronger, lasts longer. IGLOO will keep more men on the job more of the time. When you order water coolers, specify IGLOO. Available in 2, 3, 5, 10 and 15 gallon sizes.



IGLOO CORPORATION

BOX 8227

MEMPHIS 4, TENN.

first in sales/buy the best cooler--buy IGLOO

... for more details circle 329 on enclosed return postal card

NOW...

give base courses
the "traffic test"
with
BMCO's 33T7

33 Ton — 7 Wheels — Self-propelled



BROWNING[®]
BMCO
MANUFACTURING CO.

BMCO's newest 33-ton self-propelled compactor, the largest on the market, duplicates heavy truck traffic while construction is still under way, detecting weak spots in base courses and compacting to the greatest possible density. Exclusive, independent oscillation on all wheels assures complete, uniform coverage. Equipped with an extra large diesel power unit, torque converter and reversing transmission, it operates at the same speeds forward or reverse. Investigate the BMCO 33T7 before you invest in any compactor.

BROWNING MANUFACTURING CO.

P. O. BOX 2707 • SAN ANTONIO, TEXAS • WALnut 3-4331

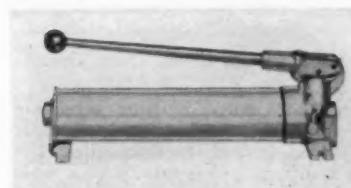
... for more details circle 288 on enclosed return postal card

150

ROADS AND STREETS, April, 1959

Hydraulic Hand Pump

A new manually operated 2-speed hydraulic pump, which changes speed and pressure automatically has been announced by Owatonna Tool Co. The pump, designed to perform common pulling jobs, provides a maximum pressure of 10,000 psi at the start of



OTC 2-Speed Hydraulic Pump

the pull. Then, after the gear, wheel, or bearing is broken loose, speed increases and pressure drops automatically. Fingertip control valve assures instant release or pumping action.

Owatonna Tool Co., 474 N. Cedar St., Owatonna, Minn.

For more details circle 137 on Enclosed Return Postal Card.

Automatic Lighting Control Device

A new automatic lighting control device, the "Skywatch", announced by Wheeler-Fullerton, is adaptable to any street light now in operation, and turns on light exactly when needed day or night. It responds immediately to sky luminosity through a photo-sensitive unit which turns the street light off or



"Skywatch" Automatic Lighting Control.

on, depending on natural light conditions. If visibility is poor during the day, "Skywatch" turns the lights on automatically. This new device cannot be accidentally actuated by stray artificial light from automobiles' lighting or neon lights.

Wheeler-Fullerton Lighting Division of Franklin Research Corp., 275 Congress St., Boston, Mass.

For more details circle 138 on Enclosed Return Postal Card.

Concrete Vibrators

Two new flexible shaft electric concrete vibrators—The Elv-5 with 5-ft. of flexible shaft, and the Elv-10 with 10 ft. of shaft have been added to the Thor line. They are available in head sizes of 1, 1 1/4, 1 1/2 and 1 3/4 in., and are designed for working concrete in small



New Thor Concrete Vibrator

areas. Both vibrators are powered by 1-hp universal electric motor and produce an impact of 10,000 to 12,000 vibrations a minute through a heavy-duty eccentric vibrator head supported by duplex bearings. The Elv-5 weighs 18 1/2 lb. and Elv-10 weighs 23 1/4 lb.

Thor Power Tool Co., 175 N. State St., Aurora, Ill.

For more details circle 139 on Enclosed Return Postal Card.

Soil-Shredder

A new large capacity power shredder for dirt movers who process dirt, peat, or clay for extra profits has been announced by Lindig Mfg. Co. This Model CL-100 is a complete soil processing plant, producing up to 100 cu. yd. per hr. The soil material is per-



Lindig Model CL-100 Shredder

fectly shredded by patented Lindig dual rotor assembly; special design allows non-shredding materials such as rocks to pass through without damage to the shredding hammers. The shredder is powered by a 60-hp gasoline or diesel engine.

Lindig Mfg. Co., Inc., 1875 County Road C, St. Paul 13, Minn.

For more details circle 140 on Enclosed Return Postal Card.

New Tamper

Compact and powerful, the J-18 tamper here pictured delivers three times the tamping power of the earlier J-12. New shoe design and weight ratio, plus improved telescoping shock-mounted handle allow this tamper to work harder, faster and with greater operator comfort. The manufacturer



The J-18 Tamper

states that the unit has been tested through thousands of machine hours on all major soil classifications and density requirements.

The J-18 is powered by a BKN Wisconsin 4.6-hp air cooled engine equipped with Jay carburetor. Travel speeds range from 30 to 60 ft per minute depending on thickness of lift and type of material to be compacted.

The Jay Company, Columbus 7, Ohio.

For more details circle 141 on Enclosed Return Postal Card.

Paving Breaker

A new air-powered paving breaker, No. 125, has been introduced by Thor Power Tool Co. The new design includes: Increase of $\frac{1}{8}$ in. in the stroke of the piston hammer at the point of fastest piston travel, providing extra



Thor No. 125

power; Bigger, heavier tappet, with $\frac{1}{8}$ in. added to all diameters; A 17% thicker tappet flange to absorb and contain the shock blow delivered through the tappet; A 30% longer tappet seat extension, giving longer sustained power thrust travel; Complete diametral housing of the tappet within the front-head, assuring full air cushioning even when the tool is running free.

Thor Power Tool Co., 175 N. State St., Aurora, Ill.

For more details circle 142 on Enclosed Return Postal Card.



No. 977 Series E "Traxcavator" Equipped with 977A Angling Bulldozer

Bulldozer Adapted to Series E "Traxcavator"

Caterpillar's No. 977A angling bulldozer is now available for the No. 977 Series E "Traxcavator." It had been available in the past only for the No. 977 Series D "Traxcavator." Changes have been made to the "C" frame and trunnion groups so that the same bulldozer arrangement can be used on either the Series E or Series D machines. The C frame is $2\frac{1}{4}$ in. wider than the former frame with trunnion groups adapting it to the series machine on which it is to be mounted. The bulldozer arrangement permits wider application of the No. 977 Series

E "Traxcavator" by adapting it for trench filling, grading and other bulldozer jobs.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 143 on Enclosed Return Postal Card.



Model CL-207 Liquid Limit Tester

ble. This results in better correlation of test results. All control parts are extruded through precision dies. The hard rubber base is formed in a mold to maintain uniformity of hardness, size and density on all devices. All adjustment features and operating hand crank are mounted on an aluminum housing.

Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.

For more details circle 144 on Enclosed Return Postal Card.

Soil Testing Machine

A new liquid limit testing machine for classification tests on soils has been announced by Soiltest, Inc. New molding and extrusion manufacturing techniques make uniformity of parts possi-

Backup Warning Device

An automatic backup warning device for heavy vehicles has been placed on the market by Atkinson Dynamics. This system was developed to meet the

STAY ON TOP TODAY—THE ROAD KING WAY

Do You Have These Jobs To Do With Your Motor Grader?

1. Old worn out grades to reshape.
2. Gravel over the shoulders to be retrieved.
3. Wet slippery slopes to be finished on new roads.
4. Ditches that can not be reached because of overhanging trees.
5. Wet plugged up ditches that will not drain.
6. Washouts in the shoulders and slopes to be filled.
7. More miles to maintain that you can handle with your present equipment.

While Doing These Jobs, Do You Have These Problems?

1. Bearing trouble in tandems from excessive slope work.
2. Getting stuck in wet ditches.
3. Cutting up tires on culverts.
4. Paying out too much for hand labor finishing new grades.
5. Maintenance costs of roads too high.
6. Unable to meet completion dates because of wet weather.
7. Unsatisfied tax payers using the roads.



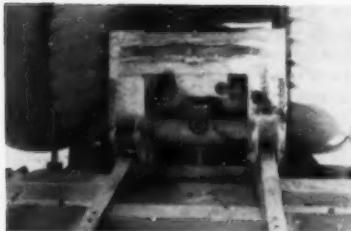
In many applications the ROAD KING sloper attachment can be the answer to all your problems and many more.

All we ask is that you let us give you the name and address of the nearest ROAD KING sloper owner in your territory. You will be very pleased to hear of the profit making experience he has had from his Road King sloper.

SEND US YOUR NAME AND ADDRESS and we will send you a booklet on the ROAD KING SLOPER along with the name and address of your nearest sloper owner and distributor.

NORTH CENTRAL ROAD EQUIPMENT COMPANY, INC.
P. O. BOX 70, NEW ULM, MINNESOTA

... for more details circle 345 on enclosed return postal card



Horn Assembly Permanently Mounted on Truck

specification requirements for the U. S. Army's Corps of Engineers on heavy construction work under their jurisdiction. During this last year approximately 200 units have been installed on equipment working on Guy F. Atkinson Co. projects on the West Coast and Alaska. Field experience to date has indicated excellent reliability and negligible maintenance for all units installed.

Atkinson Dynamics, 10 West Orange Ave., South San Francisco, Calif.

For more details circle 145 on Enclosed Return Postal Card.

Grader-Roller Attachment

A new roller attachment for Caterpillar nos. 12 and 112 motor graders, announced by Martin Co., is raised and lowered by hydraulic power, and is stated, by using the weight of the grader, to exert up to 225 lb. of compaction pressure per linear inch over its 42"



The Graderroller

roll width. The entire unit weighs approximately 2000 lbs. To match the roller angle of operation to the slope of the road, the roll is pivoted at the center and follows the road surface, regardless of the position of the motor grader. All operating adjustments can be made from the operator's platform.

Martin Co., Kewanee, Ill.

For more details circle 146 on Enclosed Return Postal Card.

Tar-Rubber Emulsion Sealer

A new sealer for concrete and asphalt surfaces, made by adding unvulcanized synthetic rubber to coal tar pitch emulsion, has been announced by the D. C. Harris Co. The name of the product is Cosmilastic. It has all

the resistant qualities of Cosmicote, (a coal tar pitch emulsion manufactured by D. C. Harris Co. which meets Federal Specification R-P-00355 (GSA-FSS), Revision #1, July 3, 1957.) plus the additional feature of a higher degree of expansion and contraction. This added flexibility is stated to allow it to move with the normal expansion and contraction of the pavement and to adhere to the paving surface for longer periods of time.

The D. C. Harris Co., Wooster, O.

For more details circle 147 on Enclosed Return Postal Card.

All-Aluminum Guard Rail

A complete all-aluminum highway guard rail system, engineered to assure rapid installation and freedom from maintenance has been introduced by Aluminum Company of America.

Formed from high-strength "Alclad" alloy, this new beam guard rail features a coating of high-purity aluminum for ultimate protection from corrosion. It



Weighs 40 lb. a Section.
Alcoa Aluminum Guard Rail

will never require painting. Available in three thicknesses, the guard rail panels measure 12 1/4" wide and 3 1/4" deep. Standard panels are 13 1/2 ft. long. The "Alclad" finish will remain highly visible, even in unusually corrosive atmospheres.

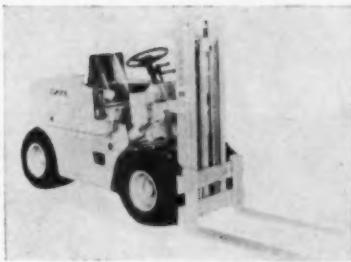
Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

For more details circle 148 on Enclosed Return Postal Card.

New Fork Truck

A pneumatic tired fork-lift truck of 5000 lb capacity designed for outdoor use over rough terrain has been added to the "Clarklift" line of fork trucks. Named the CY-50, the unit features a two speed, power shift transmission with a manually controlled "creeper" gear, a turning radius of 88 1/2 in., power steering, and a swingout hood for complete accessibility to the engine.

To provide for any type of ground conditions, four drive tire arrangements are available; single standard tire (7:00 x 12); single wide profile tire (27 x 10:00-12); dual standard tires and dual wide profile tires. With any of these arrangements, the CY-50 will climb a 22.5% grade loaded, and will travel forward or reverse at 11



The CY-50 Fork Truck for Outdoor Use.

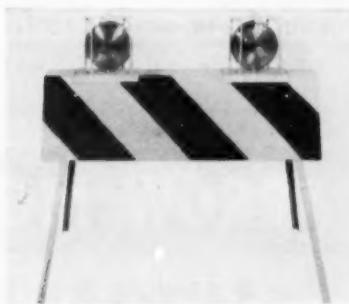
mph. Dimensions of the CY-50 are: length, 100 1/4 in.; weight, 7900 lb.

Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.

For more details circle 149 on Enclosed Return Postal Card.

Flasher Barricade

An alternating flash transistorized barricade introduced by Electronic Specialties Co., features a wig-wag effect giving from 100 to 120 flashes per minute. Features include: Transistorized heavy-duty, hermetically sealed



Alter-Flasher

power unit—no moving parts to wear out. Self-contained light and barricade for rugged use. Special guards for maximum protection of heads with minimum obstruction of light. Powered by regular 6-volt "Hot Shot" Battery.

Electronic Specialties Co., Batavia, Ill.

For more details circle 150 on Enclosed Return Postal Card.

Model PL-10 Power Buggy

Aeroil Products Co., Inc., has announced the Model PL-10 power buggy. The bucket has a capacity of 10 cu. ft., and will travel at a maximum speed of 5 mph up a 20% slope with a 1500-lb payload. Clutch and brake are operated from one hand lever while the operator has throttle control on the other hand lever. Forward and reverse gears are operated by a foot pedal.

The buggy weighs 560 lb and is 31 in. wide, 37 in. high and 75 in. long. It is equipped with 16x5.50, 4-ply pneumatic tires mounted on fine lug



Aeroil's New Power Buggy

rims. Two swivel wheels are located in the rear to stabilize and facilitate turning. A flat pallet is available in place of the bucket for hauling bricks, blocks, boxes, etc.

Aeroil Products Co., Inc., 17 Wesley St., South Hackensack, New Jersey.

For more details circle 151 on Enclosed Return Postal Card.



The Applicator

Corp. The applicator spreads a 4-ft. wide strip of materials and travels at the rate of approximately 150 ft. per minute. The manufacturer is also offering a drum tipper for pouring seal coat materials from the metal drums into the applicator for mixing.

Higbee-Reichard Corp., 947 Newport Ave., St. Louis 19, Mo.

For more details circle 152 on Enclosed Return Postal Card.

Seal Coat Applicator

A new model applicator for automatically applying emulsified asphalt and tar seal coat materials has been announced by the Higbee-Reichard

"All Traction". It is designed primarily for rural trucks and local truck operators, but it is suited also for ready-mixed concrete and construction trucking operations.

Extra tread depth, from 48 to 65% greater than regular highway tires, depending on size, is the main feature of the "All Traction."

Three continuous ribs circle the center of the tire to give it important high speed, vibration-free characteristics. Deep traction bars on the shoulder provide the necessary bite for off-the-highway operations.

The Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron 17, O.

For more details circle 153 on Enclosed Return Postal Card.

New 9.5-HP Engine

Another in its series of new engines has been announced by Kohler Co. This is Model K-241, developing 9.5 hp at 3,600 rpm. It is easy to start because of a spark advance mechanism which automatically retards spark during starting and advances it when speed is increased. Anti-friction bearings are used at both ends of the crankshaft. The cooling system directs a large volume of air, sufficient to maintain correct operating temperatures under all conditions. Standard

ARROW MOBILE HYDRAULIC HAMMER

AUTOMATIC • LOW COST

CUTTING • BREAKING • TAMPING

The operator of the Arrow Mobile Hydraulic Hammer can set the hammer control upon automatic to deliver blows of uniform impact—or he can control the hammer manually. In addition, he can use the exclusive Arrow creeper-gear to move the machine at uniform speed up to 32 feet per minute. The machine can be driven over streets and highways under its own power up to 30 miles per hour.

ONE MAN CAN DO THE WORK OF SIX—All controls are hydraulic, and are conveniently located for operation from the comfortable, fatigue-reducing seat. A wide range of hammer points and tools, easily attached, makes the Arrow ready for a wide variety of jobs such as tamping backfill, cutting asphalt, breaking concrete, driving piles. One man and an Arrow can release for other work six or more men using conventional air-tools.



Tower folds back to comply with any highway regulations



For complete information, call your Arrow Distributor or WRITE FACTORY FOR DESCRIPTIVE LITERATURE.



ARROW MANUFACTURING CO.
194 West Dakota • Denver 9, Colorado

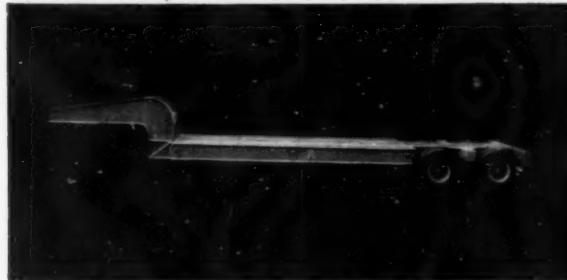
... for more details circle 283 on enclosed return postal card

TRAILMOBILE'S COMPLETE LOW-BED LINE OFFERS YOU JUST THE RIGHT TRAILER FOR EVERY APPLICATION

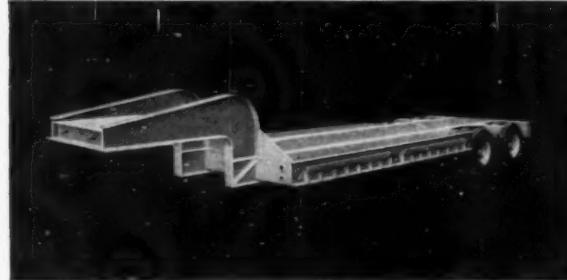
MODEL FS . . . Capacities—10, 15 tons



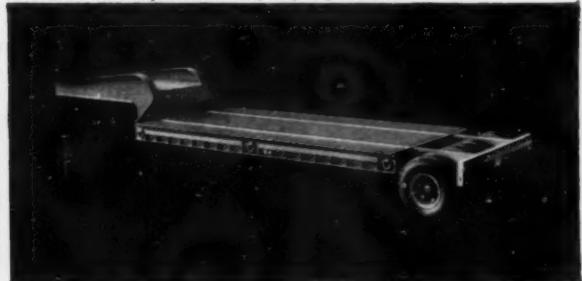
MODEL ZP . . . Capacities—15, 20, 25, 30, 35 tons



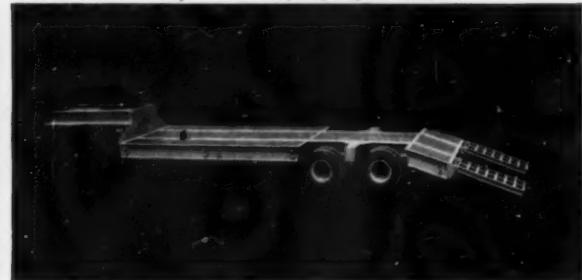
MODEL FR . . . Capacities—15, 20, 25, 30, 35 tons



MODEL F . . . Capacities—15, 20, 25, 30 tons



MODEL FZP . . . Capacities—20, 25, 30, 35 tons



MODEL FC . . . Capacities—45, 50, 60, 75 tons



EVEN 182 TONS . . .

This specially built Trailmobile Low-Bed trailer is shown carrying a generator stator weighing 365,000 pounds. This is typical of the many types of units that can be engineered to meet special requirements.



TRAILMOBILE INC.
CINCINNATI 9, OHIO • SPRINGFIELD, MISSOURI • LONGVIEW, TEXAS • BERKELEY 10, CALIF.

... for more details circle 368 on enclosed return postal card

New Products



Kohler K-241 Engine

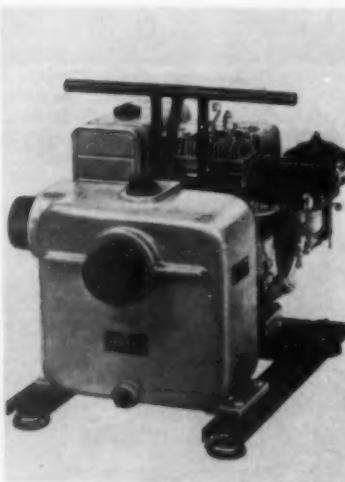
equipment includes: Heavy-duty silencer type muffler, oil bathed air cleaner, rotating chaff screen.

Kohler Co., Kohler, Wis.

For more details circle 154 on Enclosed Return Postal Card.

Light-Weight Pumps

A 3-in., all-aluminum pump, with a 4-cycle engine, weighing less than 100 lb., is now available from Midland Products Co. Capacity rating is 18,000 gal per hour. A 2-in. pump with a rating of 12,000 gal per hour is also available. All wearing parts of these pumps



Midland's New Pump with 4-Cycle Engine

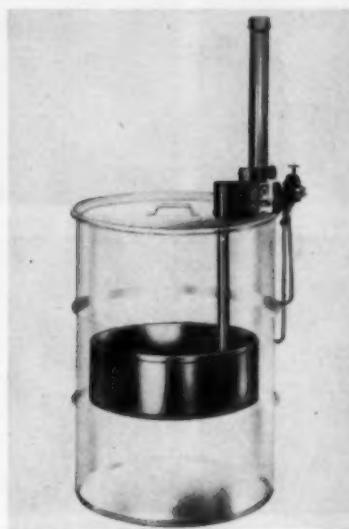
are easily and inexpensively replaced without the necessity of replacing any main castings.

Midland Products Co., Midland Park, New Jersey.

For more details circle 155 on Enclosed Return Postal Card.

Parts-Cleaning Unit

The Magnus "Porto-Lif", an air-powered, mechanically agitating device that can be attached to a 55 or 90-gallon open-head drum, or to most any tank, has been developed by the Equipment Division of Magnus Chemical



**"Porto-Lif" Agitating Device
Mounted on Open-Head 55-Gal Drum.**

ical Company, Inc. It converts the drum or tank into an efficient cleaning unit, giving parts cleaning effective air-powered mechanical agitation.

Equipment Division, Magnus Chemical Co., Inc., Dept. R&S, Garwood, N. J.

For more details circle 156 on Enclosed Return Postal Card.

New Digging Unit and Crane

The AH-4 "HydraXcavator—crane" has full hydraulic operation, with all functions, including travel, steering, wheel brakes and attachments hydraulically controlled from one operator station. Unlimited swing of the upper mechanism combined with smooth sensitive, conveniently located controls, contribute to fast work cycles.

Simplicity of design and rugged construction provide easy maintenance and service. Its compact size enables the AH-4 to be operated in the most restricted areas.

Low cost end attachments quickly interchangeable on the same basic boom and dipper stick include: backhoe, shovel, clamshell and shovel-loader buckets as well as backfill blade. Bucket capacity is $\frac{1}{8}$ cu. yd. Backhoe digging depth 11 ft. is extendable to 13 ft. High loading out position of backhoe bucket, plus long reach and full swing permit easy disposal of spoil dirt.

As a crane, the Model AH-4 can lift up to 4 tons with outriggers. A tele-



The "HydraXcavator" with Shovel Loader Bucket.

scoping crane boom or gooseneck boom can be furnished with lifting heights up to 25 feet. Maximum working speed is $4\frac{1}{2}$ miles per hour. In transport, the AH-4 can be towed by a 1-ton truck.

Davis Engineering Co., Dowagiac, Mich.

For more details circle 157 on Enclosed Return Postal Card.

100-Ton French Truck Introduced

French manufacturer Automobiles M. Berliet will display the Berliet T-100 truck for the first time in the United States at the International Petroleum Exposition in Tulsa, Okla., May 14-23. Designed to transport heavy oil equipment to heretofore inaccessible areas, the truck is 18 ft. wide.



The Berliet T-100 Truck

13 ft. high, 45 ft. long and is powered by a 600-hp turbo-diesel engine. Its payload is up to 100 tons. In spite of its size the truck is said to exert tire-to-ground pressure of only 14 lb. per sq. in., or the same pressure that a camel's foot exerts on the sand of the Sahara desert. Remarkable ease of driving is also claimed.

Agent in U.S.A., Publicis Corporation, 610 Fifth Ave., New York 20, N.Y.

For more details circle 158 on Enclosed Return Postal Card.

Maintenance Blade

A new 72-inch wide rear tractor-mounted maintenance blade, the "Lone Star," has been introduced by Servis Equipment Co.

With full reversible features for backfilling and eight other adjustments, this blade, which weighs 240 lb., is recommended for tractors with 3-point lift features having up to 30 hp rating. It is offered as suitable for

Vibrate your way to higher profits with... Maginniss Hi-Lectric Concrete Vibrators

STRUCTURES



MAGINNIS CONCRETE VIBRATORS speed up pours, cut labor costs, produce blemish-free concrete. Two 180 cycle, 120 volt models; HCV-3 for bridge, pavement and building work; HCV-6 for massive structures. Powered by choice of nine different gasoline or electric driven generators. (Uni-electric 110 volt universal motor vibrators for smaller jobs, too.)

FULL SLABS



MAGINNIS INTERNAL FULL SLAB VIBRATOR ATTACHMENT provides uniform vibration of entire slab, boosts production, reduces finishing to one pass. 180 cycle induction motor-in-head vibrators, fully adjustable for any spacing, and for depths of 2 to 35 in. Powered by compact, lightweight engine-generator. Fits all makes of paving machines.

SIDE FORMS



MAGINNIS SIDE FORM VIBRATOR ATTACHMENT fits all makes of paving machines. Prevents honeycomb, eliminates hand labor, speeds production. 180 cycle induction motor-in-head vibrators, fully adjustable for depth and spacing, choice of instant manual or hydraulic retraction. Generator also powers floodlights and service tools.

PAVEMENT WIDENING



MAGINNIS PAVEMENT WIDENING VIBRATOR ATTACHMENT fits any widener, eliminates need for accessory vibrating screed or for hand finishing. 180 cycle induction motor-in-head vibrators in hopper plasticize stiffest concrete . . . permit production rates up to 25 fpm on slip-form paving. Generator also powers service tools, floodlights.

On jobs where profit-conscious contractors are at work, you'll find Maginniss Hi-electric vibrators in action!

That's because powerful Hi-electric vibrators with induction motor-in-head design, produce up to 10,500 VPM . . . cut placing time . . . produce sounder, better looking concrete at lower cost.

Whether you're pouring footers, building structures, paving highways or airports, it'll pay you to investigate—and use—the profit-boosting features of Maginniss Hi-electrics. You'll find that Hi-electric vibrators offer true one-man operation . . . that they have no cumbersome, hard-to-maintain flexible shafts . . . that they provide plenty of power to handle stiffest concrete mixes with ease.

Whatever your concrete vibrating needs may be, your nearby Maginniss distributor can recommend . . . and supply . . . Hi-electric vibrators and generators exactly suited to your requirements. Get all the facts today!

AA-6522

Write for literature—or call your nearest MAGINNIS Distributor. He's listed under . . . "Contractors' Equipment" in 85 principal cities.



Maginniss
HI-LECTRIC
POWER
TOOLS



... for more details circle 342 on enclosed return postal card



The "Lone Star" Blade Mounted and Ready for Use.

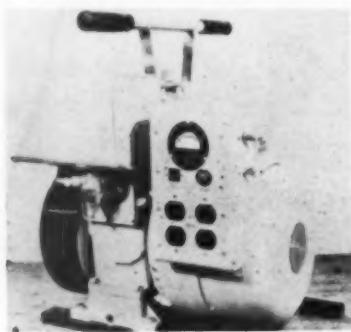
maintaining dirt and gravel roads, cleaning stock yards, leveling around housing projects, and for use around schools, parks and golf courses.

Servis Equipment Co., 1000 Singleton Blvd., Dallas, Texas.

For more details circle 159 on Enclosed Return Postal Card.

Electric Plants

Two new electric plants, Models 3500 AS and 4500 AS, 120 Volt, single phase, have been added to Pacific Mercury's line of generators. Designed specifically for construction and industrial



New Model Single Phase Electric Plant

use, these electric plants can utilize their entire capacity from one outlet, or it can be distributed among the four outlets with which the units are equipped.

Pacific Mercury, 14502 Burbank Boulevard, Van Nuys, Calif.

For more details circle 160 on Enclosed Return Postal Card.

Portable Batching Plant

A new 6-cu. yd. portable batching plant having a capacity of 40 cu. yd. per hour announced by Aeroil Products Co., features the use of Man-Ten abrasion-resistant steel in the hopper.

Beam scales with over/under indicator are furnished as standard equipment; Dial scales are optional. The conveyor is 24" wide and has a normal discharge height of 12 ft. The belt is mounted on 4" triple troughing idlers, with extra idlers provided at the loading point and a belt wiper on the head pulley. The plant is available in either gas engine or electric motor drive. To-



6 yd. Portable Batch Plant

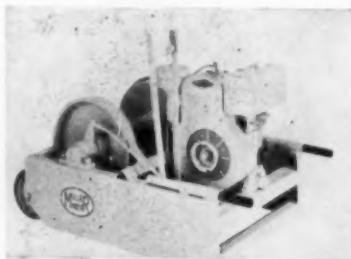
tal weight is approximately 6500 lbs. The overall width is 7 feet and the overall length is 36' 6".

Aeroil Products Co., Inc., 69 Wesley St., South Hackensack, N. J.

For more details circle 161 on Enclosed Return Postal Card.

Heavy Duty Hoists

Important recent improvements in their heavy duty builders' hoists have been announced by Muller Machinery Co., Inc. The re-designed hoists are rated at 750 and 1000-lb capacity at 200 ft per minute, and are equipped with Briggs & Stratton engines develop-



Muller Hoist

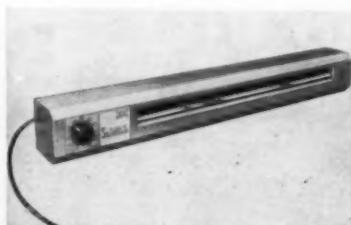
ing 5 hp and 8 hp at 3200 rpm. The drums are 4 1/2 in. diameter x 15 in. long with 16-in. flanges. The complete units measure 30 in. wide x 41 in. long x 39 in. high. Each hoist uses 400 ft of 3/4 in. manila rope, 1500 ft of 5/16 in. wire rope, or 2700 ft of 1/4 in. wire rope.

Muller Machinery Co., Inc., Metuchen, N. J.

For more details circle 162 on Enclosed Return Postal Card.

White Print Machine

A small portable rotary diazo white-print machine, the "Satellite," has been announced by Grico, Inc. It measures 44x5x5 in., weighs less than 30 lb and



"Satellite" White Print Machine

can be wall-mounted or placed on a small desk or table. Plugged into any 115V convenience outlet, the "Satellite" is immediately ready for operation.

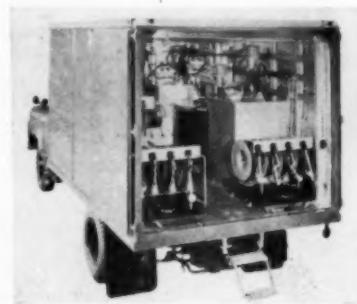
The "Satellite" produces white-prints of any length and through 30 in. in width from any translucent original. It is said that it will white-print over 94% of all tracing sizes.

Grico, Inc., 1279 Munroe Falls Ave., Cuyahoga Falls, Ohio.

For more details circle 163 on Enclosed Return Postal Card.

Mobile Lubrication Van

A new custom-engineered lub-van, announced by the Aro Equipment Co., provides complete lube service facilities in a compact mobile unit. It is capable of furnishing around-the-clock lubrication on the road or in the field.



Mobile Lubrication Van

whenever or wherever needed, according to the manufacturer. It is self-sufficient, equipped with air compressor and generator. Factors such as weather, terrain, types of heavy machinery to be lubricated, and oil company recommendations are carefully coordinated in the custom design.

The Aro Equipment Corporation, Bryan, O.

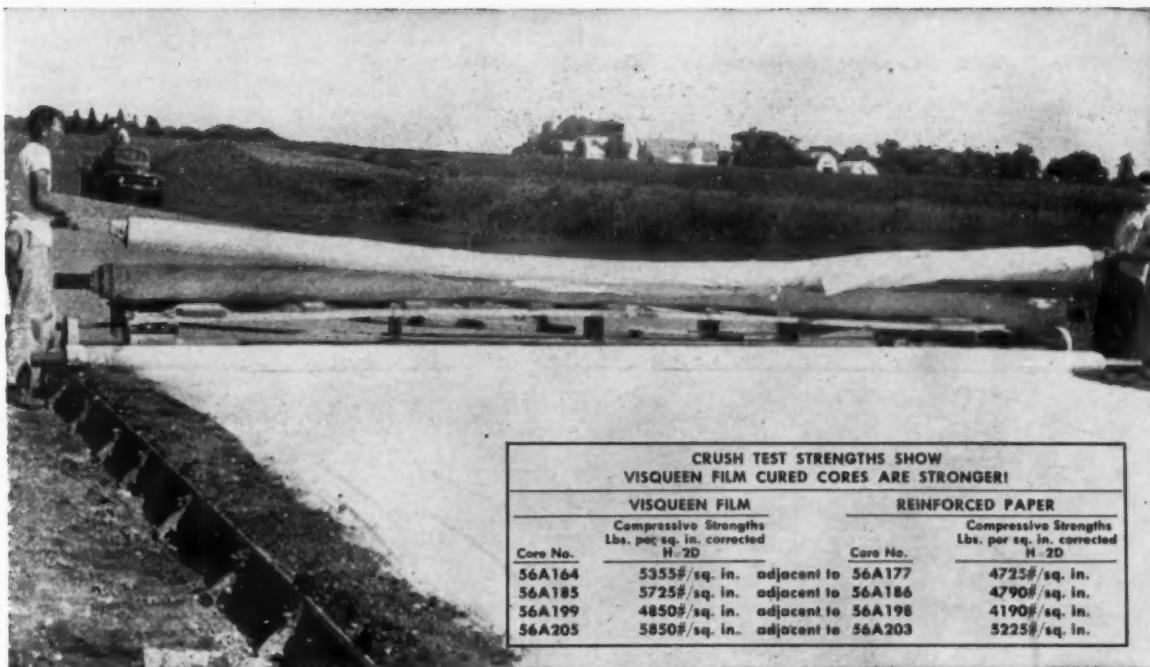
For more details circle 164 on Enclosed Return Postal Card.

Slim Hole Hose

A flexible, slim hole rotary hose stated not to "kink-off" or collapse in service is announced by B. F. Goodrich Industrial Products Co. The new "Commander" hose is furnished with an exclusive reattachable coupling that enables hose to be recoupled in the field simply and quickly, using only a vise and wrench. Reinforced with more than 10 miles of high tensile strength, heavy steel wire in every 50-foot length, "Commander" hose is designed especially for slim hole drilling and for use on portable drilling rigs, workover rigs, seismograph and geophysical rigs.

B. F. Goodrich Co., Akron, O.

For more details circle 165 on Enclosed Return Postal Card.



CRUSH TEST STRENGTHS SHOW
VISQUEEN FILM CURED CORES ARE STRONGER!

VISQUEEN FILM		REINFORCED PAPER	
Core No.	Compressive Strengths Lbs. per sq. in. corrected H-2D	Core No.	Compressive Strengths Lbs. per sq. in. corrected H-2D
56A164	5355#/sq. in. adjacent to	56A177	4725#/sq. in.
56A185	5725#/sq. in. adjacent to	56A186	4790#/sq. in.
56A199	4850#/sq. in. adjacent to	56A198	4190#/sq. in.
56A205	5850#/sq. in. adjacent to	56A203	5225#/sq. in.

Core strength tests show results obtained with VISQUEEN film curing blankets.

"VISQUEEN" FILM GIVES STRONGER CURES WITH GREATER ECONOMY

LOW FIRST COST—plus as many as 23 re-uses cut blanket costs to a fraction of a cent/sq. ft.

LOWER LABOR COSTS result because white opaque VISQUEEN film is far lighter, hence easier, more speedily handled. 1000 sq. ft. of .004" thickness weighs 20 lbs. And white opaque VISQUEEN film curing blankets stay light. Will not absorb moisture.

TIME SAVING: When using VISQUEEN film curing blankets, additional watering is not necessary. The film rolls up easily—needs no drying or special handling. Will not rot or mildew. Inert—no chemical reactions with concrete—leaves no deposit on slab.

ONLY VISQUEEN film comes in standard widths—or blankets—seamless widths up to 32'. Available in 14' roll widths with no folds.

ADDITIONAL USES of VISQUEEN film: rain blankets, equipment and material covers.

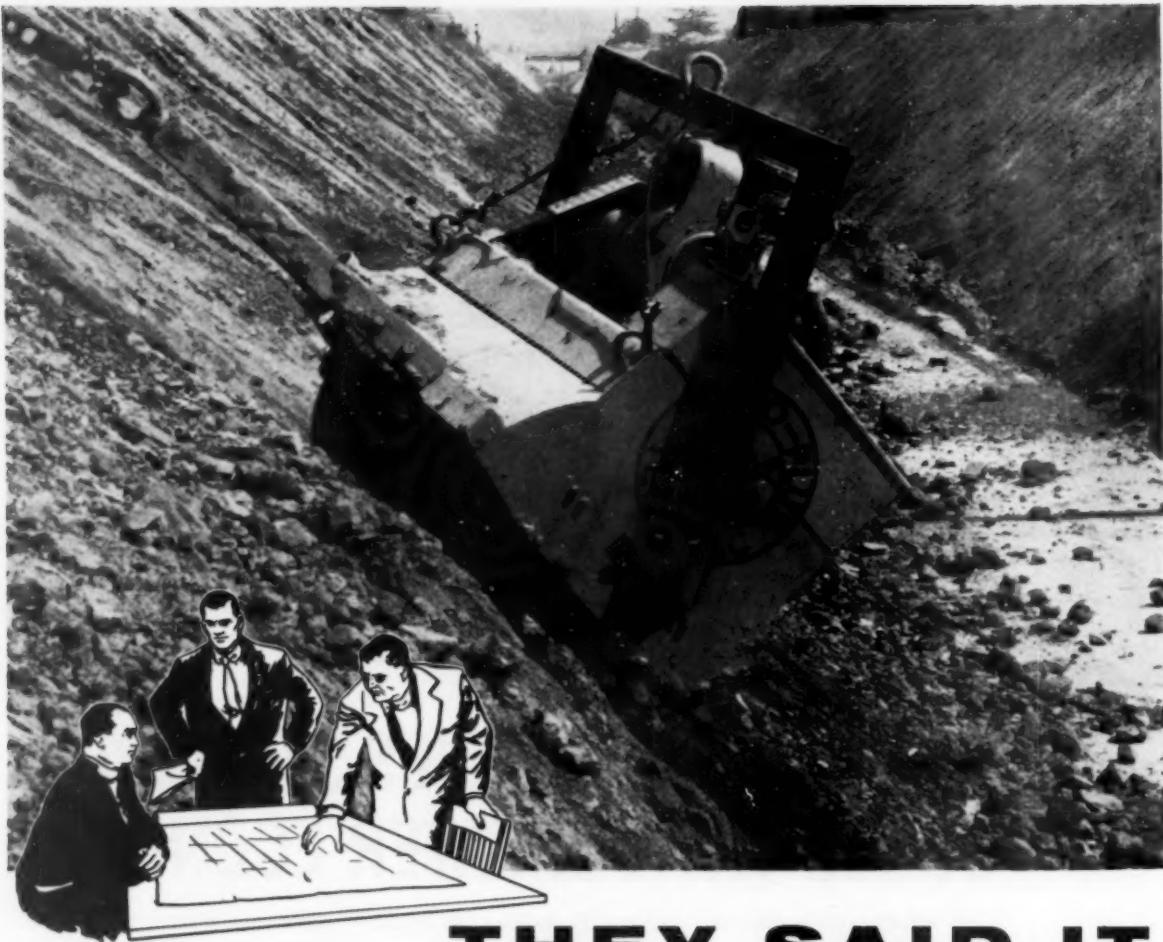
Write now—or use the information request tag below for full information on how VISQUEEN film can do your job better at less cost.



VISQUEEN film—first and foremost polyethylene film.
A product of the long experience and outstanding research of
PLASTICS DIVISION
VISKING COMPANY Division of
6733 West 65th Street, Chicago 38, Ill.
In Canada: **VISKING COMPANY DIVISION OF UNION CARBIDE CANADA LIMITED**,
Lindsay, Ontario.
VISQUEEN, VISKING and UNION CARBIDE are registered trademarks of
Union Carbide Corporation.



... for more details circle 371 on enclosed return postal card



THEY SAID IT COULDN'T BE DONE...

But, a TERRAPAC VIBRATORY ROLLER DID IT!

We used this phrase because it fit our application like a glove . . . There were skeptics on this job, experienced men who said we would never be able to hit specified densities at this sharp 45° angle . . . Our Terrapac CK-10 did just that — hit density — in only two passes . . . Compaction costs were sliced 50% . . . Thanks to the specially designed swivel mount, engineered by Vibro-Plus, there was no engine stalling . . . We know we proved the near impossible on this job . . . What have you coming up? . . . Terrapacs meet all tests — can do your job — with any of 5 vibratory compactors . . . You choose the place, let us demonstrate the point!

Ad 41-79



VIBRO-PLUS PRODUCTS, Inc.
STANHOPE, NEW JERSEY

WORLD'S LEADING MANUFACTURER OF VIBRATORY EQUIPMENT FOR OVER TWO DECADES!

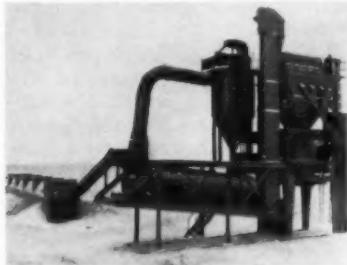
... for more details circle 370 on enclosed return postal card

New Products

90-ton Asphalt Plant

A new go-ton asphalt plant by Cutler Engineering Company offers fingertip pilot-lighted drive controls, with built-in sequence control timer, batch counter, dryer temperature controls, tower-operated burner controls, and "Detecto" dial scale aggregate control and asphalt control.

The cold feeder is available in 3 or 4-bin units, portable or stationary, also



Cutler 90-ton Plant

in 4-compartment tunnel feed. The oversize dryer has superstructure type frame with heavy removable lifting flights and heat treated thrust control wheels. The pugmill has heavy twin square shafts of alloy steel, extra heavy paddles, "Ni-hard" 4-position removable tips, and cut steel gears running in an oil-tight case.

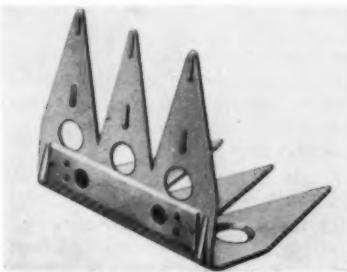
Cutler Engineering Company, 5435 W. 63rd St., Chicago 38, Ill.

For more details circle 166 on Enclosed Return Postal Card.

Traffic Guide

A new, low-cost, patented traffic guide, the M-B "Line-O-Guard", has been announced by M-B Corporation.

Constructed of durable polyethylene plastic, the "Line-O-Guard" bounces back to shape even after the crushing force of heavy trucks. Weighing $1\frac{1}{4}$ lb. it is $9\frac{1}{2}$ in. wide by $8\frac{1}{4}$ in. high and is available in bright red or brilliant yellow. Color is permanent, completely eliminating the need for re-



M-B Line-O-Guard.

painting. A weighted base and large holes in the sides make the Line-O-Guard easy to place and retrieve, preventing the unit from either blowing or rolling away. Molded feet eliminate smearing of fresh paint.

M-B Corporation, New Holstein, Wis.

For more details circle 167 on Enclosed Return Postal Card.

Rotary Power Broom

A new heavy duty compact self-propelled broom, announced by Higbee-Reichard Corp., has been designed to do many jobs that cannot be handled by larger brooms. The brush size is 48 in. wide by 17 in. diameter.

This rotary power broom is also available without the tractor. Accord-



New Rotary Power Broom

ing to the manufacturer, it has a powerful independent engine mounted on the sweeper frame which rotates the broom, making it very simple to convert a small truck, jeep or tractor into an efficient low cost sweeping unit.

Higbee-Reichard Corp., 947 Newport Ave., St. Louis, Mo.

For more details circle 168 on Enclosed Return Postal Card.

Trenching Machine

The 1959 M3 Ditch Witch trencher has been announced by The Charles Machine Works, Inc. New features include an all-riveted 20,000-lb. test dig-



Model M-3 Ditch Witch Trencher.

ing chain, telescopic digging boom, providing selection of 2-ft., 3-ft., 4-ft., or 5 ft. lengths, spring tension adjustment for digging chain and new planetary reduction unit. Standard equipment includes three piece digging chain for depths of 2 ft., 3 ft., or 4 ft., complete selection of teeth to cut trench 3 in., 4 in., 6 in., or 8 in. wide.

The Charles Machine Works, Inc., 684 B. St., Perry, Okla.

For more details circle 169 on Enclosed Return Postal Card.

Four Industrial Power Units

Four new industrial power units have been introduced by Ford Division's Industrial Engine Department. They include the most modern industrial engines fully adapted with sheet metal housing and instrument panel, electrical system, radiator assembly,



New Ford Industrial Power Unit.

skid-type mounting and other components which make the unit ready for its job.

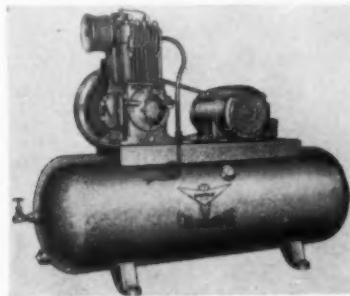
The new units are built around Ford's 330 cu. in. 6-cylinder diesel engine and the three new "Super-Duty" gasoline engines of 401, 477 and 534 cu. in. displacement.

Ford Division of Ford Motor Co., P. O. Box 608, Dearborn, Mich.

For more details circle 170 on Enclosed Return Postal Card.

Air Compressors

A complete line of reciprocating type air compressors has been introduced by Lincoln Engineering Co. They are available in over 200 models, with motor or engine capacities from $\frac{1}{4}$ hp to



New Lincoln Compressor.

20 hp, air displacement up to 92 cfm, and tank capacities up to 200 gal. Both horizontal and vertical mounted tank models are equipped for automatic start and stop operation; horizontal models also offer continuous service operation. All models are loadless starting; motor is allowed to attain full speed before compression starts.

Lincoln Engineering Co., 4010 Goodfellow, St. Louis 20, Mo.

For more details circle 171 on Enclosed Return Postal Card.

Electric Impact Wrench

A new electric impact wrench, Thor EW5A, has been announced by Thor Power Tool Co. The new tool, designed with heavy section aluminum alloy housing, has $\frac{1}{8}$ " bolt capacity, $\frac{1}{2}$ " square drive, and delivers 1,900 blows a minute with forward or re-



Thor EW5A Electric Impact Wrench.

verse speeds of 1,900 rpm. The reversing switch is a push-through finger-tip control in the handle. Other design features include $7\frac{1}{4}$ lb. weight, $9\frac{1}{2}$ " length, $1\frac{1}{2}$ " spindle offset, with 30-ft., 3-conductor lead cord as standard equipment.

Thor Power Tool Co., 175 N. State, Aurora, Ill.

For more details circle 172 on Enclosed Return Postal Card.

Backhoe Has "Hydra-Slide" Positioning

The new Davis 220 backhoe, announced by Massey-Ferguson, has "hydra-slide" adjustment to any one of five digging positions.



Davis 220 Backhoe

162

Other new improvements include increased operating pressure to 2,150 psi, larger bucket cylinder to 50% faster dumping, and a greater breakaway power up to 14,000 lbs. The new model 220 with the "Hydra-slide" makes it possible for one man to move the entire digging assembly along the frame to any of the five positions in less than five minutes.

Massey-Ferguson Industrial Division, 1009 South West St., Wichita, Kan.

For more details circle 173 on Enclosed Return Postal Card.

Large Vibrator

Designated the DHC-300 "Texan", the $43\frac{1}{2}$ lb. vibrator here pictured has a head length of 21" and a diameter of 4". It was developed especially for continuous service on big jobs—dams, aircraft runways, launching pads—where pours are deep and aggregate is large, and is said to be the largest high-cycle concrete vibrator ever built utilizing a rotary centrifugal eccentric.

The "Texan" operating on 180 cycle current, is available in either 115 or 220 volts. The Dart-developed "Generac" motor, in conjunction with a maximum amplitude eccentric, definitely places this vibrator in the gen-



The DHC-300 "Texan" Giant Vibrator

eral utility field. RPM under full load at 183 cycles is 10,800. Motor has normal output of 1,920 watts.

A key feature is the removable motor section which may be replaced quickly in the field. Bearings are grease-sealed. Automatic resetting thermal breaker prevents burn-out due to heat or current overload. The unit may be operated singly on a 3-KW generator. Optional handles are available to clamp on handling hose for easier operation. (See picture)

Dart Manufacturing & Sales Co., 1002 South Jason Street, Denver 23, Colo.

For more details circle 174 on Enclosed Return Postal Card.

Film Explains Dual Drum Paver Operation

The Bureau of Public Roads has produced a motion picture, "Lost Mixing Time of Dual Drum Pavers." The film, based on extensive studies of portland cement concrete paving, conducted by Public Roads, highlights the importance of the simultaneous mixing interval in dual drum pavers, in meeting mixing time specifications. It shows some trouble spots and the significance of proper adjustments to the batchmeter. The film had its premier showing at the annual meeting of the Highway Research Board in Washington, D. C., January 6, 1959.

Contractors and engineers will have a particular interest in the contrasting scenes which illustrate why two successive batches of portland cement concrete from a dual drum paver are frequently mixed for a different length of time. The film also illustrates how minimum mixing time for which the batchmeter is set can be measured.

In commenting on paver cycle control, a Bureau bulletin said, "In the tremendous highway construction program now under way, the Bureau of Public Roads has a vital interest in improvement of job management which results in the highest rate of production consistent with quality. Greater attention to what may superficially seem to be trivial problems permits the contractor to offer lower bids on construction work without cutting his profits, and provides the engineer with greater assurance that the end product will measure up to his standards of quality."

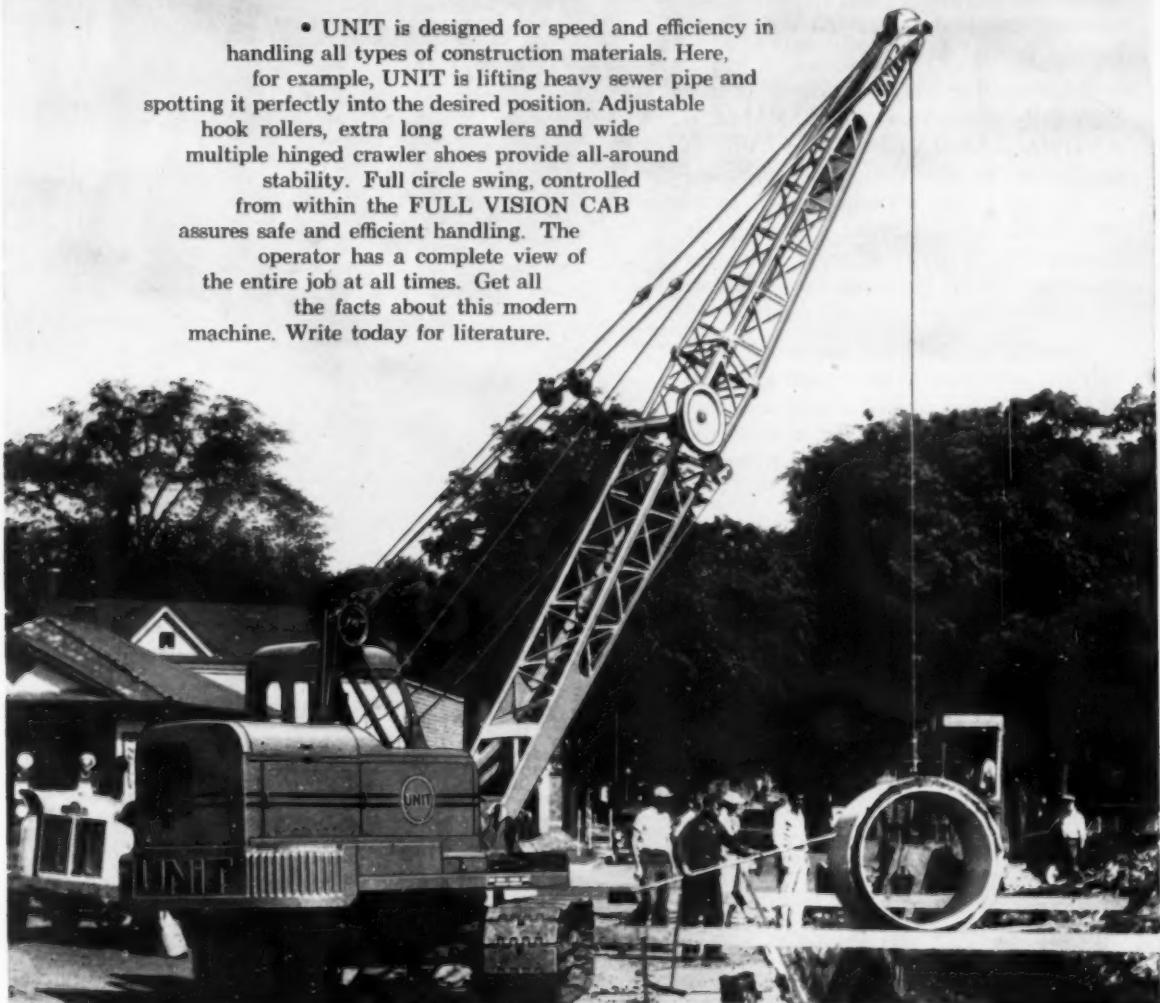
"Lost Mixing Time of Dual Drum Pavers" is a 16-mm. sound and color film with a running time of 30 minutes. Prints may be borrowed for showings by any responsible organization by request addressed to Ray B. Dame, Chief, Photographic Services, Bureau of Public Roads, Washington 25, D. C. There is no charge except for the express or postage fees. Requests should be sent well in advance of the desired showing, and alternate dates should be given if possible. Prompt return after each showing is necessary, so that all requested bookings may be fulfilled.

Prints of the film also may be purchased at \$127.45 per copy, the price including film, reel, can, and shipping container, and postage within the United States. Payment should not be sent with the inquiry.



fast Handling with **SAFETY!**

• UNIT is designed for speed and efficiency in handling all types of construction materials. Here, for example, UNIT is lifting heavy sewer pipe and spotting it perfectly into the desired position. Adjustable hook rollers, extra long crawlers and wide multiple hinged crawler shoes provide all-around stability. Full circle swing, controlled from within the FULL VISION CAB assures safe and efficient handling. The operator has a complete view of the entire job at all times. Get all the facts about this modern machine. Write today for literature.



**UNIT CRANE
and SHOVEL CORP.**

6407 W. Burnham St., Milwaukee 19, Wisconsin, U.S.A.

... for more details circle 369 on enclosed return postal card

Let's Pave with More Than GOOD INTENTIONS

Paving schedules are always tight at best. And inclement weather, material shortages, late deliveries, equipment downtime — all often combine to defeat the best of intentions. But it's difficult to explain to the public.

Your answer may be found in the high daily production of the SEAMAN-ANDWALL PULVI-MIXER. And in the faster, superior compaction provided by the big, highly maneuverable 7 to 20 ton SEAMAN-ANDWALL Pneumatic Compactor. They're a great team for finishing *ahead* of schedule — whether it's a city street or highway paving.

The PULVI-MIXER on most work will mix any road material with any type of binder at the rate of a mile a day of 24 foot wide pavement. And it leaves the mix perfectly blended, shaped to crown and grade — ready for the 5620 Compactor.

There are better earnings for the contractor and public good will for the highway or street authorities — in "finishing ahead" . . . So, let SEAMAN-ANDWALL equipment convert good intentions into reality with low cost, low maintenance, high load-bearing, stabilized pavement.



Here are 2 Bulletins, one on the PULVI-MIXER and TRAV-L-PLANT, the other on the 5620 Compactor. They're yours for the asking. Just send a postcard. We'll send them to you — promptly.



5620 Pneumatic Compactor closely follows TRAV-L-PLANT. 5620's "straight down" compaction principle prevents scuffing or material displacement.

SEAMAN-ANDWALL
CORPORATION
A Subsidiary of American-Marietta Company
Elm Grove 9, Wisconsin



TRAV-L-PLANT pumps water from tanker in salt stabilization. Highway job was at 11,000 ft. altitude.



SEAMAN-ANDWALL
PULVI-MIXER operates right up to curb on city street.

... for more details circle 358 on enclosed return postal card

Manufacturers' Literature

ROAD CONSTRUCTION AND MAINTENANCE EQUIPMENT: A new 8-page booklet (No. SG-25) released by Seaman-Gunnison Corp., 2763 S. 27th St., Milwaukee 1, Wis., covers their full product line of road construction and maintenance equipment. Illustrated and described are the newly introduced "Tri-Pactor" and the S-G utility scraper.

For more details circle 175 on Enclosed Return Postal Card.

HEAVY DUTY AIR MOTORS: A new bulletin by Joy Manufacturing Co., Oliver Building, Pittsburgh 20, Pa., describes 72 Models of the company's line of "Pistonaire" air motors, ranging from 11½ to 20 hp. Complete specifications, dimension drawings, torque and horsepower curves are included.

For more details circle 176 on Enclosed Return Postal Card.

BATCH TYPE ASPHALT PLANT: An 8-page bulletin (M-59) has been issued by Hetherington & Berner, Inc., 701-745 Kentucky Ave., Indianapolis, Ind., on its new Model 20, completely wheel-mounted batch type asphalt plant, which has a capacity of 40-60 tons per hour. Illustrations and descriptions are included of the mobile feeder, the tank and heater unit, dryer unit, gradation unit, hot elevator and mixer unit. Plot plan and specifications are given.

For more details circle 177 on Enclosed Return Postal Card.

CONTROLLING GROUND WATER: A new 28-page catalog (PP-8358) available from Product Information Service, Armco Drainage and Metal Products, Inc., deals with perforated pipe for controlling ground water. Included are recommended methods for installation, drawings of standard fittings, tables, and pictures of representative installations.

For more details circle 178 on Enclosed Return Postal Card.

TECHNICAL DATA CATALOG: A newly revised catalog for 1959 of Lefax pocket size technical data books, selling at \$1.25 each, has been announced by Lefax Publishers, Philadelphia 7, Pa. These handy books cover every field of engineering. Books contain about 140 loose leaf pages of up to date material. Partial list includes: Highway Engineering, Surveyors Tables, Surveying Theory and Practice, Rein-

forced Concrete, Steel Forms, Art Shapes, and Conversion Tables.

For more details circle 179 on Enclosed Return Postal Card.

ENGINE DRIVEN GENERATING EQUIPMENT: A new series of educational pamphlets covering complicated electrical and technical characteristics of engine driven generating equipment has been issued by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Titled "Onan Power Talks", the pocket size bulletins deal with the various technical phases of Onan products (electric generating plants, air-cooled engines, separate generators, their operation and their use).

For more details circle 180 on Enclosed Return Postal Card.

ARMCO FOUNDATION PRODUCTS: A new catalog (FP-13558) available from Product Information Service, Armco Drainage & Metal Products, Inc., Middletown, Ohio, describes pipe piles, coissons, and "Hel-Cor" pipe shells, and tells where they are used. Also included are tables on dimensions and weights, pile driving hammers, and data for competing pile bearing capacity.

For more details circle 181 on Enclosed Return Postal Card.

DIESEL ENGINES: A new 12-page illustrated brochure describing the wide selection of industrial and automatic engines now available in GM Diesel's new All-Purpose Power Line has been released by Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Mich. Booklet gives power ratings and overall dimensions on over 100 in-line "V" and turbopower models.

For more details circle 182 on Enclosed Return Postal Card.

SPROCKETS AND IDLERS: A new 8-page booklet (D 868) entitled "Power and Guidance", available from the Advertisers Division, Caterpillar Tractor Co., Peoria, Ill., discusses design features of the company's sprockets and idlers. Booklet illustrates various design characteristics and manufacturing processes which contribute to long, distortion free life for these components.

For more details circle 183 on Enclosed Return Postal Card.

PORTABLE BATCHING PLANT: A 4-page bulletin (CB-100) issued by Clark Industries, Construction Equipment Division, 375 East Fifth Avenue, Columbus 1, Ohio, describes the new Clark "Trans-Plant", a portable unitized batching plant.

For more details circle 184 on Enclosed Return Postal Card.

SOIL SAMPLING BOOKS BY ACKER: Recently announced by Acker Drill Co., Inc., P. O. Box 830, Scranton, Pa., is "Basic Procedures of Soil Sampling," an easy-to-follow guide for builders, construction contractors, civil engineers, or architects, illustrated with more than 100 drawings and field photos, arranged in three parts with a total of 16 chapters. The price is \$1.00.

Also priced at \$1.00 is the new, pocket size, non-technical, 36-page, "Basic Procedures of Diamond and Shot Core Drilling," with more than 100 drawings and field photographs illustrating operational conditions. Both books are returnable within 7 days if not satisfactory.

Other publications announced are the 50-page, "Drill Supplies Catalog," and 15 special bulletins dealing with core drills, augers, sampling kits, rigs, bits, and allied items.

For more details circle 185 on Enclosed Return Postal Card.

STEEL PAVING FORMS: A new 4-page bulletin (CRPF-333) issued by Clark Industries, Construction Equipment Division, 375 East Fifth Avenue, Columbus 1, Ohio, describes Clark "Wedge-Lok", road, airport, curb, gutter, and sidewalk paving forms.

For more details circle 186 on Enclosed Return Postal Card.

LUBRICATING COMPOUNDS: A new folder, published by the Whitmore Mfg. Co., Cleveland 4, Ohio, describes the uses and applications of two new anti-friction lubricating compounds, said to have no melting or dropping point. Test data and performance characteristics of special interest to earth movers are enclosed.

For more details circle 187 on Enclosed Return Postal Card.

AIR HOIST LINE: A new 8-page brochure published by Yale Materials Handling Division, The Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa., gives complete specifications, operating data and accessory information on the new line of Yale air hoists. All critical dimensions for installing are detailed in schematic drawings.

For more details circle 188 on Enclosed Return Postal Card.

ELECTRIC GENERATORS—Its complete line of electric generators is described and illustrated in a 4-page brochure (Folder F-141) issued by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Precise specifications on the various controls to operate each type of generator are described and illustrated.

For more details circle 189 on Enclosed Return Postal Card.

MOTOR AND AIR CARRIER DIRECTORY: The Spring, 1959, issue released in March by Official Motor Carrier Directory, Inc., 1025 W. Congress Pkwy., Chicago 7, Ill., lists nearly 2,000 Class I motor common carriers with information on officials, equipment, terminal addresses and phone numbers, equipment, insurance, tariffs and service. A new section covers all major scheduled U.S. airlines which offer direct service on air cargo shipments, with information similar to that for motor carriers.

Supplementary information deals with U.S. and Canadian ports, the ICC, Bureau of Motor Carriers, Bureau of Public Roads, Tariff Publishing Bureaus, state agencies governing transportation matters, and organizations related to motor transportation.

For more details circle 190 on Enclosed Return Postal Card.

EXPLOSIVES: The 82-page, 1959 edition of a booklet listing Hercules explosives, blasting agents, and blasting supplies is available from Hercules Powder Co., Wilmington 99, Del. The booklet for the first time, lists the company's blasting agents. Included is a helpful 2-page summary of the properties of Hercules explosives and an index to a complete description of each.

For more details circle 191 on Enclosed Return Postal Card.

REPRODUCING ENGINEERING DRAWINGS: Four time-saving methods in reproducing engineering drawings are presented in a folder, available from Peerless Photo Products, Inc., Shoreham, L. I., New York. The solutions which involve the use of the new Peerless "Photo Positive" one-step direct-position paper, are outlined in detail.

For more details circle 192 on Enclosed Return Postal Card.

DOZER, SCRAPER BLADES: An 8-page 2-color booklet (CR-177-1) entitled "Here's the Inside Story on Cutting Edges", has been issued by International Harvester Co., 180 N. Michigan Ave., Chicago 11, Ill. The booklet describes how operators can get considerably longer life from cutting edges and scrapers with exclusive IH "Dura-blades".

For more details circle 193 on Enclosed Return Postal Card.

"MICRO-MASTER 105MM": A new 4-page folder (25883-5M), announced by Keuffel & Esser Co., Adams and Third Sts., Hoboken, N. J., describes the features and accessories of its "Micro-Master" 105mm photo reproduction system for engineering drawings. The folder describes how the "Micro-Master" system reproduces almost any size drawing, restores smudged or worn originals to almost perfect legibility, guarantees distortion-free accuracy, and by producing permanent negatives of

"archival quality" allows economical establishment of a disaster storage file.

For more details circle 194 on Enclosed Return Postal Card.

BACKHOES: A new 8-page catalog has been issued by the Badger Division of The Warner Swasey Co., Winona, Minn., on its new Model 500 TM, 200 SPR and 200 SPC "Hopto" backhoes. Complete general information on all models of "Hopto" is included, along with on-the-job pictures, on a wide variety of operations.

For more details circle 195 on Enclosed Return Postal Card.

TRAFFIC CONTROL PRODUCTS: A 16-page catalog has been published by Traffic Equipment Co., 2064 South Bannock St., Denver 23, Colo., on its all-steel barricades and other traffic control products. Features of the many types of barricades are illustrated and described. Included also are illustrations and descriptions of many traffic control accessories.

For more details circle 196 on Enclosed Return Postal Card.

"ALUMINUM BRIDGE RAILINGS," a new folder, available from Reynolds Metals Co., Dept. PRD-5, Box 2346, Richmond 18, Va., contains complete drawings and specifications on aluminum bridge railings and accessories. The 26 separate drawings are printed on tracing paper for convenient use.

For more details circle 197 on Enclosed Return Postal Card.

"HOW CATERPILLAR DEALER ENGINE SPECIALISTS CAN SAVE YOU MONEY": A new booklet (Form No. 40-20186) for contractors, available from Caterpillar Tractor Co., Engine Division, Market Services Department, Peoria, Ill., shows the services rendered to prospects and customers for Caterpillar diesel engines to provide both regular or standby power in a wide variety of applications. An interesting treatment is given to the techniques and services provided by the Caterpillar dealer engine specialists.

For more details circle 198 on Enclosed Return Postal Card.

"ADHESIVES AND SEALERS": A new 4-page, illustrated catalog describing a complete line of adhesives and sealers for the building and construction industry is available from the Adhesives, Coatings and Sealers Division, Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

For more details circle 199 on Enclosed Return Postal Card.

"DIAMOND WHEELS FOR CARBIDE GRINDING": A new brochure available from Advertising Distribution Section, Building W-5, The Carborundum Co.,

Welmore Road, Niagara Falls, N. Y., deals with diamond wheels (both natural and man-made diamond) for carbide grinding. Recommendations are listed on the six most common applications.

For more details circle 200 on Enclosed Return Postal Card.

ALUMINUM BRIDGE RAILINGS: A new 24-page brochure "Bridge Railings and Components", available from Kaiser Aluminum & Chemical Sales, Inc. Department Nr-27, 919 North Michigan Ave., Chicago 11, Ill., describes the complete line of Kaiser aluminum products in this field. Engineering information and installation data are included.

For more details circle 201 on Enclosed Return Postal Card.

AN 8-PAGE BOOKLET (D904) ENTITLED "7 + 6 + 4 = 17" gives seventeen reasons for the working ability built into Caterpillar D7, D6 and D4 tractors. This is available from The Advertising Division, Caterpillar Tractor Co., Peoria, Ill. The 3-color booklet is illustrated with on-the-job photographs of the three machines.

For more details circle 202 on Enclosed Return Postal Card.

MERCURY LAMP BALLASTS: A 6-page bulletin (GE 1467 B) has been published by General Electric Co., Schenectady 5, N. Y. describing its new "Bonus Line" ballasts for all outdoor lighting uses. Application data, performance and construction features, ordering information, and operating data are included.

For more details circle 203 on Enclosed Return Postal Card.

TRENCHER: A 6-page bulletin has been issued by Arps Corporation, New Holland, Wis., describing and illustrating its new "Trench-Devil" Model M-A one-man operated trencher, which digs trenches $2\frac{1}{4}$ in. to 8 in. wide and up to 54 in. deep. It has digging speeds up to 1200 ft. per hour in either direction.

For more details circle 204 on Enclosed Return Postal Card.

Rosco MANUFACTURING CO., 3118 Snelling Ave., Minneapolis, Minn. has just released a 4-page bulletin on its Model SR-9-T2 self-propelled, 9-wheel pneumatic tire roller. The bulletin is well illustrated and fully describes all the features of the roller. These include a modern, large bore, short strike, overhead valve engine, torque converter, power brakes and steering. A unique single pedal control for forward and reverse speeds up to 30 miles per hour gives smooth, instant change of direction as well as speed of travel.

(Continued on page 188)

200 cubic yard-per-hour output of NOBLE job-site batching plant key to largest concrete construction contract

By providing up to 1000 cubic yards per day of quality concrete unobtainable from local sources, a NOBLE job-site batching plant was instrumental in securing the largest concrete job ever let in the Phoenix, Arizona, area — 60,000 cubic yards—for Job Concrete Construction Company, Pomona, California. With the NOBLE plant batching and discharging 4 cubic yards of cement and aggregates in 72 second cycles at the job site, only 10 transit-mix trucks, each hauling an average of 80 cubic yards per day, are required to supply all concrete for 2,000,000 square feet of slabs, gutters, sidewalks and foundations on the Luke Air Force Base housing project of 725 homes and for lining a 2 1/2 mile long flood control ditch. With recorder and other automatic controls to meet rigid Corps of Engineers specifications, the plant has a 4-compartment 150 ton capacity overhead aggregate bin and a separate 500 barrel capacity overhead cement silo. A second overhead cement silo can be added using the existing 350 barrel-per-hour vertical cement elevating screw.



All NOBLE batching plants with overhead aggregate storage capacities ranging from 100 to 500 tons or more feature big savings from fastest erection. NOBLE requires no outside purchase of essential components or extensive field assembly and wiring. These normally out-of-pocket expenses with conventional plants are included in the price of NOBLE and may become a part of long-term equipment financing. Available cash is thereby released for current expenditures.

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B-800

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DALLAS 35, TEXAS—2512 W. Mockingbird Lane, Fleetwood 7-1904

NEW YORK 17, N. Y.—52 Vanderbilt Ave., Oregon 9-6475

Export Distributor, Fratzer International Corp., San Francisco

Eastgate 2-4518

DISTRIBUTORS: BIRMINGHAM, ALA., Equipment Service Co., Inc. • PHOENIX, ARIZ., Western Machinery Co. • LOS ANGELES, CALIF., Smith-Booth-Usher Co. • DENVER, COLO., Western Machinery Co. • CHICAGO, ILL., Arrow Contractors Equipment Co. • INDIANAPOLIS, IND., Fleisch-Miller Tractor Co. • DANVILLE, KY., Central Supply & Equip. Co., Inc. • BOSTON, MASS., Hodge & Mattheis Co. • DETROIT, MICH., R. G. Hoeller Co. • ST. PAUL, MINN., Borchert-Ingwersen, Inc. • BILLINGS, MONT., Seitz Machinery Co. • ST. LOUIS, MO., George F. Smith Co. • OMAHA & NORTH PLATTE, NEB., Construction Service Equipment Co. • ALBUQUERQUE, N. MEX., Contractors Equipment & Supply Co. • SYRACUSE, N. Y., L. B. Smith, Inc. • STATESVILLE, N. C., Interstate Equipment Co., Inc. • CLEVELAND, OHIO, Wepco Equipment Co. • PORTLAND, ORE., Clyde Equipment Co. • HARRISBURG, PA., Highway Equipment & Supply Co. • PITTSBURGH, PA., Equipment & Supplies, Inc. • NASHVILLE, TENN., Peterson Machinery Co. • DALLAS, TEX., Lumby Machinery Co. • EL PASO, TEX., Border Machinery Co. • HOUSTON, TEX., Pearce Equipment Co. • SAN ANTONIO, TEX., Girard Machinery & Supply Co. • SALT LAKE CITY, UTAH, Arnold Machinery Co. • SEATTLE, WASH., Star Machinery Co. • SPOKANE, WASH., Western Machinery Co. • CASPER, WYO., Studer Tractor & Equipment Co., Inc. • CALGARY, ALB., Precision Machinery & Equipment, Ltd. • VANCOUVER, B. C., Westcoast Equipment, Ltd. • TORONTO, ONT., Crothers Mfg., Ltd. • MONTREAL, QUE., Laurentide Equipment Co., Ltd.

... for more details circle 346 on enclosed return postal card

Bituminous ROADS AND STREETS

Mastic Asphalt

Wearing Surface for German Autobahnen

The development of suitable mechanical finishers enabled the German highway engineers to take advantage of the qualities of mastic asphalt for Autobahnen and Expressways.

By **Paul J. Fluss**

TESTING ENGINEER,
SAN FRANCISCO PORT
AUTHORITY

The use of mastic asphalt (Guss-asphalt) for paving has a long successful history and the sidewalks, and the streets of many European capitals and cities are proof of its excellent wearing qualities.

The growing automobile traffic

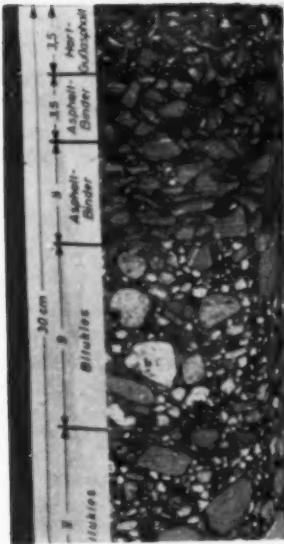
made it necessary to change the original composition of mastic asphalt in order to increase its skid resistance. By using a larger percentage of crushed rock and reducing the asphalt content, a greatly improved and rough surface texture was achieved. But the mixture still had to be placed by hand, for which reason its use did not expand according to its technical merits. Only after suitable finishers had been developed, which made ma-

chine placing possible, was mastic asphalt made competitive. Now it not only takes its proper place in the construction of European city streets but it is also quite extensively used for Autobahnen and Expressways in Germany.

Among the notable projects for which mastic asphalt has been used are several sections of the following Autobahnen: Frankfurt-Nürnberg; Frankfurt-Koeln; Koeln-Duesseldorf; Duesseldorf-Oberhaus-



• Equipment train showing both mechanical finisher and spike-toothed roller for making waffle pattern in surface.



● Core from a pavement project showing asphalt-gravel base (two layers), coarse and fine aggregate binder courses, and 1½-in. mastic asphalt wearing surface.

en; Duesseldorf-Wuppertal; Koeln-Aachen; Avus Berlin; and Berlin Expressway Ring.

What are the reasons for this popularity of mastic asphalt? Various reports about the mentioned and other construction projects, published in several German technical magazines, summarize the following advantages:

(1) Based on the long excellent performance record of its use for city streets mastic asphalt is to be considered the most durable of all asphalt pavements.

(2) Due to the surplus of asphalt it contains it has a high cohesive strength and therefore very little tendency to cracking, and for the same reason it is also completely watertight.

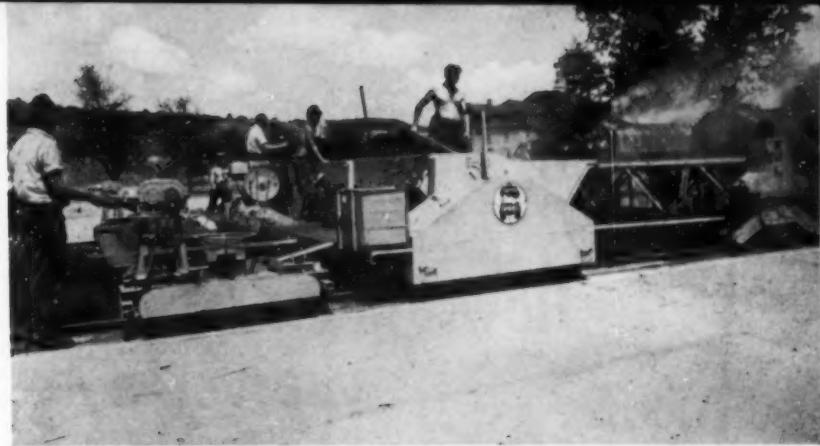
(3) Its abrasion resistance is very high. The city of Kassel has used it successfully for street crossings and curves to withstand the destructive action of turning military tanks.

(4) In construction it is less dependent on the weather.

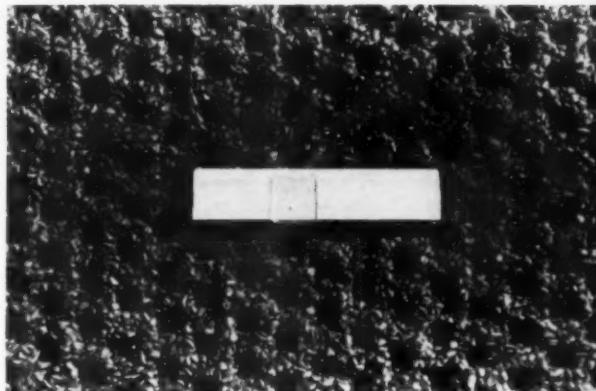
(5) After placement it does not need any subsequent compacting, such as rolling.

(6) Its maintenance is simple and can be done economically.

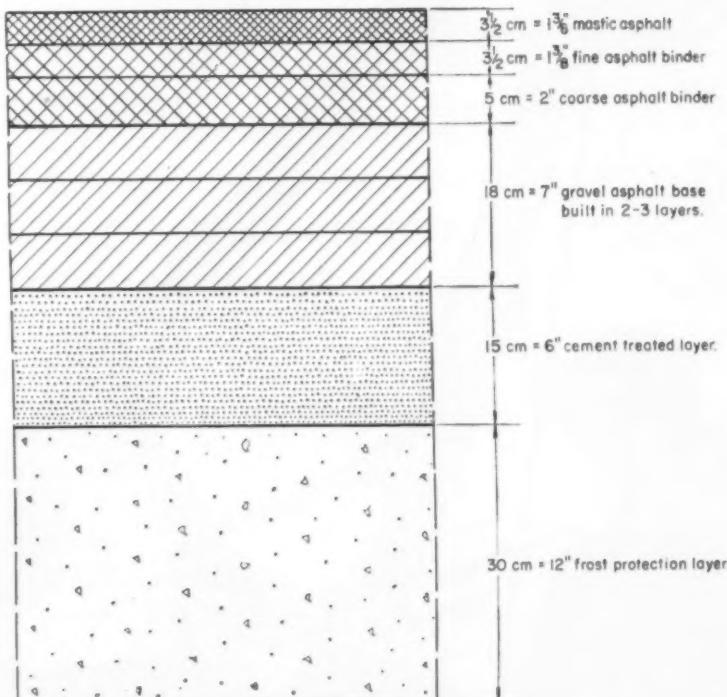
Mastic asphalt as used at the present time is based on the specifications of the City of Berlin, issued in 1953, which, according to Dr. Ing.



● On this job, finisher, stone spreader and spiked roller are combined into a single unit.

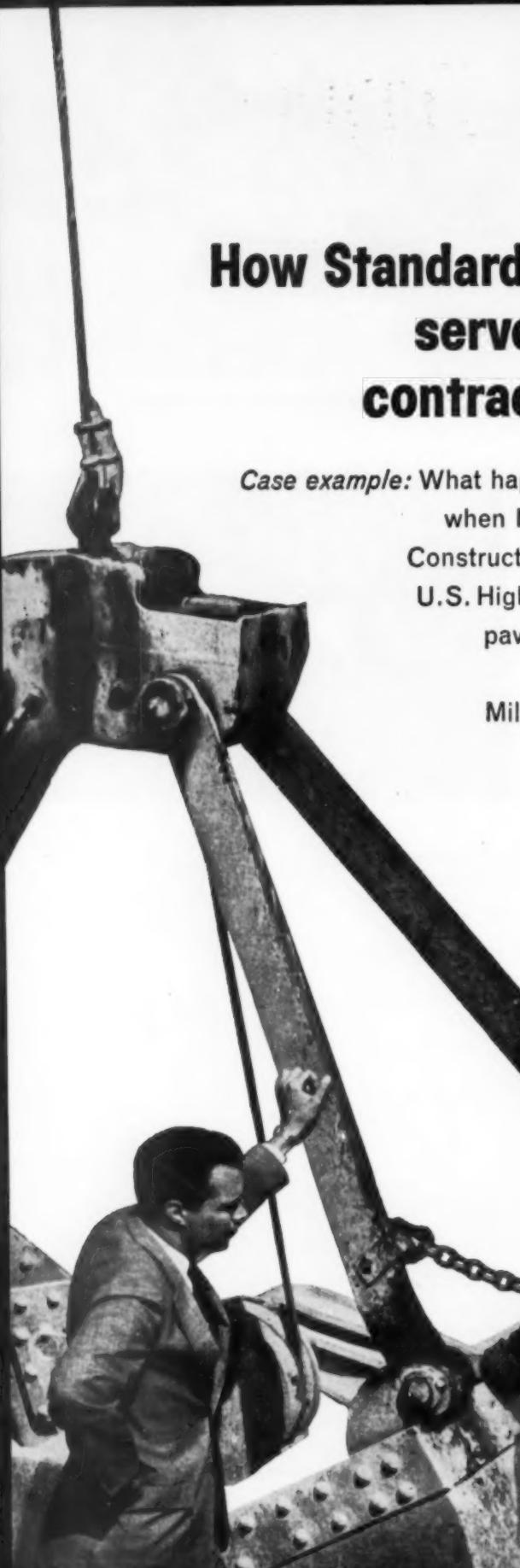


● Close-up of the waffle pattern of surface finish, designed for good traction.



● Cross-section of pavement for the Frankfurt-Nuernberg Autobahn.

(Continued on page 172)



How Standard Oil serves a contractor

*Case example: What happened
when Isabella
Construction got
U.S. Highway 41
paving job
near
Milwaukee*

When N. M. Isabella, Inc. set out to put down 26 miles of pavement on U.S. Highway 41, they met Standard Oil's Jerry Bushman, an experienced automotive lubrication specialist. Jerry was ready right then to provide technical assistance on the job.

The contractor next learned about Standard Oil service when two Standard agents went into action. One agent, they found, was based at Slinger, only three miles away. Another agent was located at Allenton, only five miles from the part of 41 to be paved. These agents set up delivery schedules to the job, and meanwhile, Jerry Bushman arranged for fuel storage and pumping equipment.

Isabella put down 363,000 square yards of paving, averaging 1,600 feet of production daily. They got the job done because they were backed by the kind of service they, and their subcontractors, received from Standard.

Standard has 3,900 agents in the 15 Midwest and Rocky Mountain states ready to serve contractors in the same way these two agents served Isabella. Lubrication technical service comes from qualified, trained men located in Standard's 48 district offices. Get this kind of help on your job. Call the Standard office nearby or write to **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.**

You expect more from  and you get it!

**Standard Oil Petroleum
Products used by
N. M. Isabella, Inc.**

**STANOLUBE S-1 Motor Oil
STANDARD RED CROWN Gasoline
STANOLEX Diesel Fuel
AMOCO Lithium
Multi-Purpose Grease**

Standard's Jerry Bushman and Don Isabella wind up some lubrication details. Jerry knows the score when it comes to lubrication of construction equipment. He has a science degree from Marquette plus more than four years' experience in this sort of work. He has also completed the Standard Oil Sales Engineering School course.

... for more details circle 359
on enclosed return postal card

Iowa Highway Records Being Microfilmed

The Iowa state highway commission recently launched a sweeping program of microfilming a half-century of field notes and plans accumulated by survey crews, inspectors, and designers since 1907. The purpose is to relieve congested storage vaults and to more economically and permanently index and store the data for reference.

The history of every primary road in the state and many secondary roads can be traced through field notes and plans to its origin. Over 57,000 eighty-page field notebooks are involved, as are 500,000 road plan sheets.

Each plan sheet will be recorded on 35 mm film. In contrast to the field notes, which are filmed at 65 books every 45 minutes, the blueprinted plans must be individually photographed with special attention given to proper exposure of each sheet.

When the entire project is completed and catalogued, it will take only a few minutes to pick out any set of plans or field notes from 1917 to the present. In addition, any microfilm copy can be enlarged and duplicated for use as reference material.

One of the oldest field books discovered was used by Thos. H. McDonald, who became chief engineer in 1907, when the highway commission was known as the Good Roads Section at Iowa State College. McDonald subsequently became the famed, long-time head of the Bureau of Public Roads in Washington.

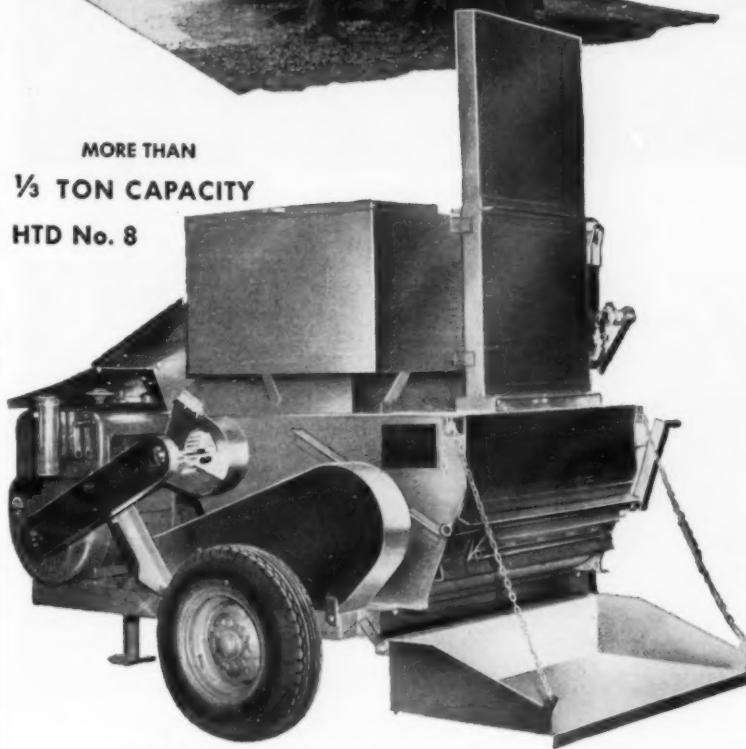
One nostalgic entry in an old field book dated 1904, reported that the roads were smooth and were suitable for sledding full loads. Corn was selling at 45 cents a bushel; oats, 32 cents; hay, \$5 a ton; cattle, \$4; and hogs, \$4.50.

An excerpt from a September 5, 1909 book recorded while constructing the Alton to Orange City road, listed a grading crew as follows: "Crew consists of 5 men, 1 woman (cook), 14 head mules, 3 head horses, 1 elevating grader, 1 horse tent, 1 cook tent, and 2 sleeping tents."

BOB FITZGERALD has joined State Equipment Co. as sales representative in Huntington, Mifflin, Union and Juniata counties. He will handle construction equipment sales of International Harvester, Hough, Drott and related lines.



MORE THAN
1/3 TON CAPACITY
HTD No. 8



McConnaughay OFFERS the most complete line of Asphalt Patching Mixers

3 TO 20 TONS QUALITY HOT MIX PER HOUR

Here are the mixers you need for fast, economical pavement repairs and small surfacing jobs... in any season... under wet or dry conditions. They are precisely engineered and rigidly constructed to handle on-the-job mixtures of asphaltic concrete, sheet asphalt, sand asphalt or mastic asphalt... hot or cold... at remarkably high rates. They will enable you to meet all conditions with least effort and at lowest possible costs. Write for complete specifications and proportioning tables.



HTD No. 10



HTD No. 5



HTD No. 4-T

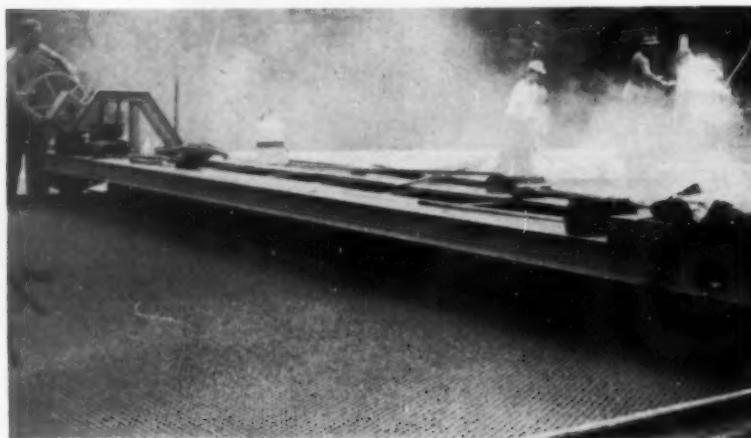
McCONNAUGHAY MIXERS, INC.
LAFAYETTE, INDIANA

National distributors: Asphalt Equipment Co.
3314 Cherry Lane, Fort Wayne, Indiana

... for more details circle 340 on enclosed return postal card



• Note wave of fluid mastic asphalt ahead of the finisher screed.



• The finisher surface as seen immediately back of the spiked roller machine.

(Continued from page 169)

Paul Wichert, Dresden go far beyond the provisions of DIN 1996 (German Industry Standard) of 1957. Among them are:

Void content of the combined mineral aggregate, vibrated to constant volume, not to exceed 18 percent.

Asphalt surplus maximum 4 volume parts. This limits the excess asphalt that has to be used in addition to the quantity, necessary to completely fill the voids.

Unit volume weight of mastic asphalt at least 2.35.

For the various sections, totaling about 46 miles, of the Autobahn Frankfurt - Nuernberg, materials

and approximate mix proportions were in accordance with the accompanying table.

Mastic asphalt can be proportioned and mixed in hot-mix plants and is transported to the construction site in heated mixer trucks, having a capacity of 4-5 tons. Using wheelbarrows or chutes it is poured in front of the finisher and placed at 400-440° F., depending on the ambient temperature. The finishing operation consists only of screeding by means of a strike off device. There are several finishers on the market. Those which are wide enough to finish the whole one way width of Autobahnen, which is $7\frac{1}{2}$ meters or 24 feet, travel on rails. For greater skid resistance crushed rock No. 4 to No. 10 is spread on the still warm asphalt mastic at the rate of $7\frac{1}{2}$ lb. per sq. yard, and embedded with a spiked roller, which gives the surface a waffle like effect. The impressions made by the spiked roller have a depth of approximately $\frac{1}{4}$ in. To improve adhesion usually crushed rock is used, which had been precoated with 1% asphalt. Rock spreading and roller spiking can be done manually or by suitable mechanical equipment either separately or combined with the finisher and also traveling on rails.

Based on its performance record it is contemplated to use mastic asphalt for the whole length of the Berlin Expressway Ring and of the Autobahn Frankfurt - Nuernberg, which is planned to be part of the future Pan European Highway 5.

Alabama Launches "Crash" Engineering Program

Following the Alabama legislature's enactment of bills authorizing a \$60 million highway bond issue, State Highway Director Sam Engelhardt announced his department is initiating a "crash" program on engineering which will require the services of private engineering firms as well as a build-up in highway personnel.

In explaining the necessity of using private firms in some areas, Engelhardt noted that each month's bid letting under the state's expanded highway construction program will equal the largest record to date at any time. "We will have to let \$9 million to \$10 million in contracts each month to accomplish the road program," he said.

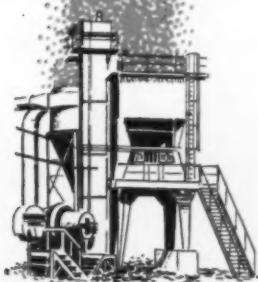
Mastic Asphalt Mix Proportions

Hard rock (predominantly basalt) 100% cubically crushed in varying proportions of 3 separate approximate sizes: $\frac{1}{2}$ " to $5/16$ ", $5/16$ " to No. 4, and No. 4 to No. 10.
Sand No. 6 to 0.
Limestone dust (filler)
Asphalt, penetration 70-100, 50-70 or 30-50
Trinidad asphalt, containing 56% soluble bitumen
Total

Per Cent (by Weight)
40-47
18-27
23-26
6.4 - 6.8
1.3 - 2.0
100

LOCAL AGGREGATE

...good
as
GOLD



No longer do you have to haul high cost aggregate long distances. That local aggregate (even though normally hard to coat) is "as good as gold," and easily coated when you add **PAVE** to the asphalt.

PAVE increases the coating properties of asphalt cement, cutbacks, and emulsions for wet or dry aggregates—and prevents stripping. Use **PAVE** to open up new sources of aggregate in areas where all available stone is considered marginal, or where the easily-coated stone is rapidly being depleted.

You can have these benefits economically, since only a small amount of **PAVE** does the job. Our Technical Service Staff will gladly advise the amount of **PAVE** needed to coat your "stubborn" aggregate. Write today!



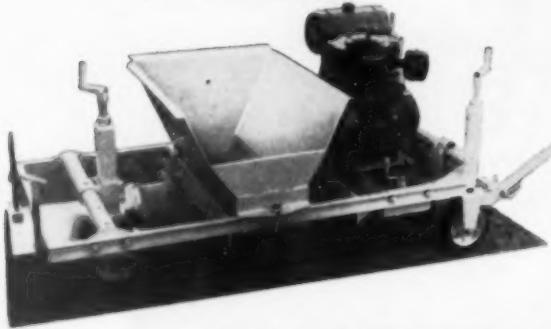
CARLISLE
CHEMICAL WORKS, INC.

READING, OHIO

... for more details circle 302 on enclosed return postal card

YOU'RE PASSING UP PROFITS

**...if you're not extruding
curb today!**



and this **NEW MILLER®**
MC-500 CURBER has the proved
money-making features

YOU NEED!

FOR ASPHALT

... the MC-500 is a rugged, self-propelled champ at laying LOW-COST curbing on turnpike median strips, sub-divisions, parking lots, wherever there's pavement.



FOR CONCRETE

... of Zero Slump, the MC-500 is ideal. Load it right from the mixer into the reversible hopper for amazing, compacted concrete curbs over Base Pavement. Asphalt finish surface makes watertight seal at the base.

SEE IT NOW at your MILLER DISTRIBUTOR'S SHOWROOM. Ask to have it demonstrated. This NEW MC-500 Curbler extrudes curbing from RIGHT or LEFT side . . . you'll be amazed at the complete and easy maneuverability. See its easy, job-mated adjustments designed to fit your curbing requirements!

ORDER YOURS TODAY

DON'T MISS the BIG, extra-profit CURBING MARKET . . . opportunities are everywhere! You'll be happy at the LOW PRICE of the MC-500 . . . it's the most versatile, money-making Curbler on the market!

SEND FOR THIS NEW FOLDER, NOW!

Get the facts on how this MC-500 "pays for itself," and earns a profit while doing it!



MILLER® © MSC
SPREADER CORPORATION
YOUNGSTOWN 12, OHIO

Towed Pavers

Shovel Heaters

Lutes and Hand Tools

... for more details circle 344 on enclosed return postal card

174



• Firestone Rub-R-Road compound R-524 is poured directly into a tank truckload of hot asphalt, where the two are blended by the truck's mixing equipment.

Rubber Compound Blended on Job

A new method for mixing rubber into asphalt for resurfacing highways, developed by The Xylos Rubber Company, has been successfully tested on Ohio Route 631 near Macedonia. The method according to C. R. Shaffer, president of the Firestone subsidiary, is the easiest method yet devised for blending the materials for resurfacing highways with rubberized asphalt.

A liquid called Rub-R-Road Compound R-524 is poured into a truckload of hot asphalt and may be blended on the job. The rubberized asphalt is then sprayed from the truck onto the pavement.

Most other systems necessitate the premixing of rubber and asphalt loading. The Xylos compound is a ready-to-blend liquid, not in pellet or powder form, and does not require the boiling off of water. All the compound needed to rubberize the asphalt required for the surface treatment of one mile of 24-ft. wide highway can be carried in three 55-gal. drums.

The addition of rubber to asphalt is claimed to impart increased weather resistance and toughness to the asphalt, better binding the stone to the surface.



• State Route 631 near Macedonia, Ohio, being resurfaced with a mixture of hot asphalt and rubber compound.

... By H. G. Nevitt

STATUS OF SEALCOATING—1959

WE LIKE to give attention to the subject of sealcoating, believing this merited for several reasons. And we think its importance justifies occasional comment even though some repetition seems inevitable.

Sealcoating is the most important maintenance operation, if overlays and other basic betterments are not so classed. Highways are subject to wear. This not merely removes some of the structure (thereby in theory diminishing its load carrying capacity, though this so far has not been a large factor) but also changes the surface characteristics. The latter change is often quite detrimental, usually through a marked drop in the resistance to skidding provided by the pavement: however, other undesirable consequences, such as the crushing and loss of particles where soft aggregates must be utilized, are often present. In addition non-wear factors often bring about defects which require sealcoating—or even armour coating, which we define (to distinguish it from sealcoating) as the construction of a new layer which appreciably thickens the pavement—to correct the trouble and again provide a suitable surface. The result of this situation is that sealcoating represents the largest item of cost in maintaining roads properly constructed for the traffic using them.

Our second reason for interest in this subject is that the engineering of sealcoats seems the least understood of all the phases of highway engineering. Why this is so is not entirely clear to us. While not as simple as most highway engineers seem to think (judging by the frequent disregard of basic principles by otherwise capable men) they are certainly less complex, require less understanding of basic scientific laws than, say, the action of water on bases. Whatever the reason, the fact remains that sealcoat jobs which meet the five usual objectives of the operation and get the most

possible for the money expended, seem the exception rather than the rule.

The fault cannot be lack of information. While many phases of sealcoat technology need increased exploration, and in some details the authorities may not appear in complete agreement, the overall aspects and general requirements for good work have been discussed with some frequency. Space does not permit calling detailed attention to the errors most commonly seen, and there are many possibilities in this respect (not to mention replication of errors, particularly where further mistakes are made in an effort to offset incorrect practices). But poorly graded aggregate, incorrect asphalt or aggregate type, and poor construction practices (particularly traffic control) are probably the most common.

● Has there been much improvement in this field in the last five or ten years? Not much, in our opinion. As in all other phases of highway work, downright sloppy and obviously bad practices are less frequent, simply due to the expansion of road building, more experience and observation by all concerned, and similar corrective developments. Some idea of the future possibilities have been brought out by new techniques, particularly the use of rubberized asphalt with its improved adhesion. However the problem with this material is essentially a matter of economics. If sounder and more exact results cannot be obtained through the use of cheaper (though perhaps specialized) materials, rubberizing may be well worthwhile. But if it succeeds under present conditions it may be said to have won by default, since many of the actions which, in combination, might produce equally satisfactory results without rubberizing, simply haven't been widely tried to our knowledge.

We believe this is a fertile area for the equipment manufacturer:

proper methods, or efficiency built into the equipment instead of being sought through job supervision in this day of skilled personnel shortage, might be the answer to better sealcoating results. The field has of course received much attention: but most of the effort has been to develop equipment which does the same job more cheaply than by the usual combination of distributors, trucks and spreaders. This is of course a logical consequence of the lack of engineering standards: if the contractor will get no premium for better work through the use of special equipment, he will be motivated to decide his investment therein primarily on the basis of cost savings rather than improved job quality. Actually there has been some effort to also gain the latter. Both contractors and equipment makers need to be sound businessmen to survive. An intensive and extensive development program on sealcoating equipment will not appear until there is some assurance that the better results will produce adequate recognition and compensation for the makers and users of machines which make these results possible.

Is there any way to get a better and more widespread understanding of sound sealcoating engineering principles, along with this application to practice?

We wish we knew of one, but we do not have too much hope. For years we have seen areas of poor results coupled with high costs, at least on a long range basis, immediately adjacent to moderately good results at lower expense, with no change by either group. Of course the poor results, high cost people have a ready answer to any criticism —there is apparently some mystic change in the soil, aggregates and other factors at state, county or city boundaries so that "the conditions are different." Yet we have much

(Continued on page 179)

AAPT HAS GOOD DENVER MEETING

Following is a brief review of the areas covered, and comment on a selection of the papers.

The Association of Asphalt Paving Technologists had a meeting at Denver in late January which seemed in the opinion of those attending to offer much of interest in this field. The meeting was presided over by Professor William H. Goetz, president, who is succeeded by Moray F. MacNaughten of Montreal in the coming year.

The papers might be classified into three general groups. These are essentially research studies, presumably leading to further practical applications; papers concerning the general properties of asphalt or asphalt pavements; and laboratory papers. Noticeably absent were papers on construction subjects. It would appear that asphalt paving engineers do not feel that further strictly constructional advances are likely until additional progress has been made in the fields of design and materials.

The research papers were a discussion of fatigue properties in bituminous concrete by Papazian and Baker; and a study of the rheological characteristics of a sand-asphalt mixture by Wood and Goetz. Both indicate the trend towards an appraisal of paving mixture properties on a more scientific basis.

There were a number of papers on the subject of bituminous pavement action or properties. Included in these were the following: Discussion of road variables in asphalt performance by Krichma and Groening. This paper pointed out that asphalt pavement performance is the result of complex action by a number of variables, and that great care must be used in distinguishing between the different effects. For example, the literature was reviewed and showed that asphalt hardening is greatly affected by void content and therefore asphalt

cannot be compared except where this characteristic (as well as others) is held constant.

A paper by Campen, Smith, Erickson and Mertz showed that even where the voids and stability values are held constant the average film thickness of the binder may vary considerably, with presumable effects on the pavement quality or durability. The findings of the first paper mentioned were likewise emphasized by a discussion of test trends over a four-year period on the Michigan experimental road, by Parr and Serafin.

Papers on asphalt more specifically as a material were: a tabulation and discussion of the properties of U. S. petroleum asphalts by Welborn and Halstead; a review of the factors believed to relate chemical composition and rheological properties with durability by Professor Gallaway; and an examination of the significance of the Oliensis spot test by Heithaus and Fink. These three papers indicate the need for a closer understanding of the properties of asphalt and their effect on durability and functional effectiveness.

The Welborn and Halstead pa-

per brought out that, on the basis of the tests commonly used to characterize asphalts, there has been little change in the properties of petroleum asphalt in the United States for quite a few years.

Gallaway's conclusions are that properties not now normally investigated in connection with the practical use of asphalts have significance and should be brought into the specification picture.

Heithaus and Fink showed that the characteristics which appear to have significant effects in the life of asphalt do not correlate with the results of the spot test, these properties being found associated with either negative or positive spot material.

A discussion of cationic asphalt emulsions by Wright and Mertz pointed out that the proper type of emulsion to use is dependent upon the aggregate characteristics.

A discussion of mineral fillers by Warden and Hudson constituted a further paper in the material design group. They pointed out that there is presently no widely accepted method of evaluating the suitability of mineral filler in asphalt mixes, but that such a test is widely needed. The paper indicated that the characteristics of the asphalt-filler mortar—obtained by mixing the asphalt to be used with varying contents of each available filler, or that proposed for use—may serve as an indication of the filler quality or suitability. This conclusion is based on the observation that there is an apparent relation between the variation of these mortar characteristics with different fillers and suitability of the filler for paving purposes, as shown by actual use; the inference being that the same qualities which make the filler effective produce the desired mortar characteristics.

Better Specs Needed—And Better Correlation of Material Properties with Job Results

The attitude displayed at the Denver meeting might well be summed up, by the statement that there is growing realization of the need for more exact and scientific correlation between material and mix properties, and the resultant service given by the pavement, while greater precision in specifying the materials and their handling is clearly becoming necessary.

It is believed that many of the papers given at the Denver session are merely steps forward in the growing development of asphalt paving technology.



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The paper's conclusion was therefore that, pending further exploration into the subject, the sensitivity of the filler as shown by its tendency to raise the softening point and lower the penetration at low filler-asphalt ratios would serve as a warning of its lesser desirability for use in the mix. In view of the increasing realization that filler quality and amount seriously affect the properties of a mix, this paper is perhaps the forerunner of further

similar studies.

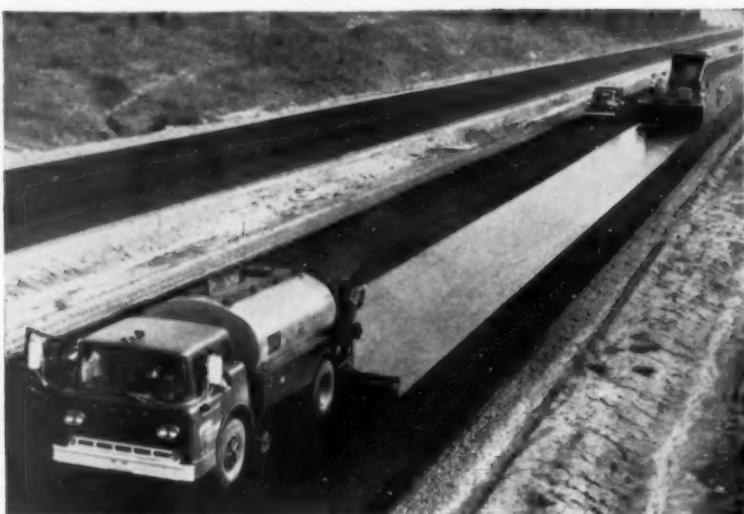
Two of the laboratory papers concerned the mixing process. Ward and Warden discussed the Ross Count method of measuring mixing efficiency. This paper pointed out the need for some way to tell when the mixing process has been completed, and offered a visual count of the uncoated particles as developed by the late Bruce Ross as a means for doing this. Visual methods however re-

ceived much criticism in the succeeding discussion. Tunnicliff briefly discussed an elaborate study of the mixing process made at Cornell University. He reached a number of conclusions concerning the effects of the different variables involved in this operation, ranging from such matters as the viscosity of the bitumen to the flow of the mix in the pugmill. Some of the conclusions of this paper were extremely interesting and indicate the large field of exploration possible in the mixing operation.

It seems likely that there will be a number of further papers on this subject in the coming years and that mixing, which has been somewhat accepted without discussion for a number of years, will be opened up as a subject for debate and presumably in the end, improvement.

Some sources of stability measurement variations were discussed by Nevitt. This paper pointed out that the results of laboratory compaction by vibration, by the kneading compactor and by the Marshall impact vary greatly in their reliability, the accuracy of the results being in the order given, and that the error in the Marshall method particularly demanded the making and testing of a number of samples to get results sufficiently reliable for most purposes, with the general conclusion that accuracy in the stability measurement requires much more attention than it has received so far.

A paper by Abson and Burton, reporting some investigations of failures of bituminous surfacing, had interest in that it documented several situations where the deterioration of the pavement in actual use was closely related to the failure to follow well-known technical practices. The paper clearly brought out that the application of technology to the construction of asphalt pavements is definitely tied in to the results to be expected from these pavements in service.



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TWO NEW SALES REPRESENTATIVES
APPOINTED BY HUBER-WARCO: Carl B. Paepke was recently appointed District Sales Representative by Huber-Warco Company, Marion, Ohio. His territory includes the states of Connecticut, Massachusetts, Rhode Island, Maine, Vermont, New Hampshire and Upper New York State, and the provinces of Ontario, Quebec, New Brunswick and the Maritimes.

(Continued from page 175)

sympathy for highway administrators these days, with their competent and experienced personnel spread too thin to provide the detailed engineering and close attention that each sealcoating project usually demands.

The hope for the future seems interesting the younger men in sealcoating problems, to doing some "experimental" or demonstration projects for which the needed supervision can be arranged, and in general to give recognition to the fact that sealcoating is not a casual job but a difficult operation justifying real engineering attention.

We believe this need will be increasingly urgent. Modern traffic counts and traffic speeds produce deleterious effects on the pavement surface at a rate undreamed of not too many years ago. Yet the accompanying need for greater road safety is focusing attention on this matter of surface quality to an increasing degree. The idea held by some that pavement surface quality can be built into the project is, we believe, erroneous. The converse, that surfaces which almost immediately develop "polish" and become dangerous can be avoided is, of course, sound; but even on the best surfaces we feel that (with a few exceptions) the maintenance of surface quality implies periodic, well engineered and constructed sealcoating.

There is another aspect of the situation which re-enforces this belief. It is becoming clear, and well documented with data, that asphalt hardening and pavement deterioration in general are linked closely with void content. The voids cannot be too low, but they likewise cannot be high for assured long life; and designers should concentrate on this point. Sometimes low voids, ample asphalt film thickness and the other attributes of a pavement with durability, flexibility and fatigue resistance can be attained without sacrifice of surface quality; more frequently they cannot. In the latter case the ideal solution is a mat built for pavement life, a sealcoat for surface quality—provided the sealcoat is so constructed as to give, and for a reasonable period retain, these characteristics.

We constantly stress that the principal job of the highway engineer is to provide more good pave-

(Continued on page 185)



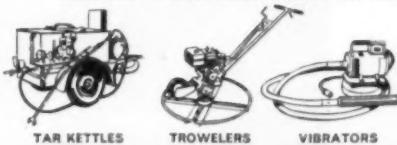
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DELAWARE'S EXPERIENCE WITH



Without Neoprene After two weeks of traffic, bleeding is in evidence on the control test section.

Neoprene

Modified **Asphalt**

Following successful tests cut-back made with synthetic rubber modified asphalt has been specified for sealing of a substantial mileage of this state's roads.

By **Stanley S. Scarborough**

Testing Engineer, Delaware State Highway Department

Based on nearly one and one-half years' experience in both field tests and routine application, neoprene (synthetic rubber) modified asphalt shows encouraging performance results on Delaware highways. Its use appears to be an aid in solving long-term problems of road maintenance.

The problems are familiar ones—maintenance of surface treated roads in areas of heavy traffic count without available alternate routes, and extension of road surface life in low population rural areas.

Delaware's problems are not unique, but they are highly concentrated. While two of the state's three counties are primarily agricultural, the third—New Castle—is one of the most rapidly developing areas in the East.

Along with rapid industrial and commercial growth, population has shot up, bringing extensive sub-

With Neoprene No evidence of bleeding. Uniform carpet of cover stone with little whip-off, after two weeks of traffic on the experimental section.



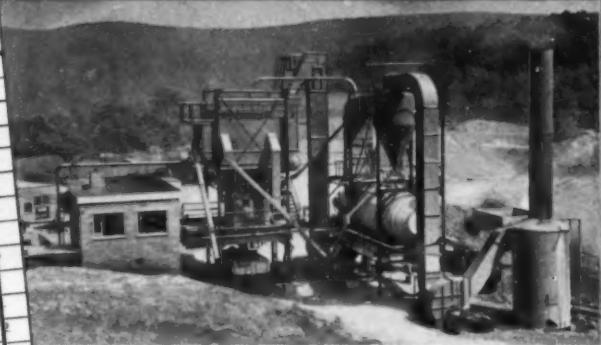
SIMPLICITY S-200 STRUTS HER STUFF

Not Because She Puts Out
100 or 200 T. P. H.
But Because She Is STEADY

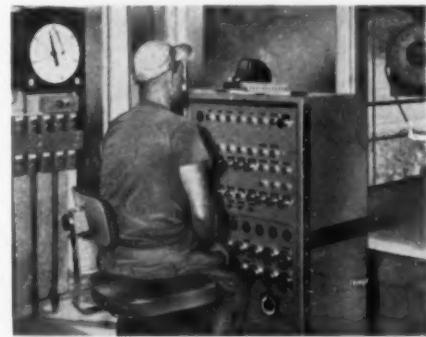
NITTANY MATERIALS INC.
— WEIGHT AND DELIVERY REPORT —
Accounting of all tickets required

Plant No.	6	Job No.	7207-2450	P. O. No.	Material	Load No.	Customer	Totals	Truck No.	Rate
Date	7-1-58				20-250 DUMBER	1	HR INDUST INC	105	M-55	5.22
47593	105	"				2	"	210	M-33	6.00
94	105	"				3	"	300	M-90	6.00
95	90	"				4	"	460	M-90	6.00
96	160	"				5	"	620	M-89	6.00
97	160	"				6	"	735	M-48	6.00
98	11.5	"				7	"	840	M-34	6.00
99	10.5	"				8	"	945	M-31	6.00
47600	10.5	"						1025	M-43	6.00
01	80	"				9	"	1140	M-36	6.00
02	11.5	"				10	"	1300	M-88	6.00
03	160	"				11	"	1460	M-87	6.00
04	160	"				12	"	1575	M-92	6.00
05	11.5	"				13	"	1735	M-101	6.00
06	160	"				14	"	1840	M-91	6.00
07	10.5	"				15	"	1955	M-35	6.00
08	11.5	"				16	"	2060	M-46	6.00
09	10.5	"				17	"	2165	M-70	6.00
10	10.5	"				18	"	2270	M-37	6.00
11	10.5	"				19	"	2420	M-30	7.00
12	150	"				20	"	2570	M-78	7.00
13	150	"				21	"	2675	M-100	7.00
14	10.5	"				22	"	2790	M-49	7.00
15	11.5	"				23	"	2875	M-57	7.00
16	10.5	"				24	"	3055	M-23	7.00
17	160	"				25	"	3215	M-22	7.00
18	160	"				26	"	3375	M-20	7.00
19	160	"				27	"	3535	M-1	7.00
20	160	"				28	"	3695	M-9	7.00
21	160	"				29	"	3810	M-38	7.00
22	11.5	"				30	"	3900	M-52	7.00
23	90	"				31	"	4060	M-10	7.00
24	160	"				32	"	1895	1925	M-38
	54	11.5	"			62	"	1920	8085	M-9
	55	160	"			63	"		617.5	M-52
	56	9.0	"			64	"			
	85	160	"			87	"			
	86	160	"			94	"			
	87	160	"			95	"			
	88	160	"			96	"			
	20	160	"			127	"			
	49	160	"			128	"			
	50	16.0	"			157	"	20025	M-22	4.00
	51	9.0	"			158	"	20115	M-55	4.00
	52	16.0	"			159	"	20215	M-67	4.00
	53	10.5	"			160	"	2038.0	M-33	4.00
						161	"			

For many years Simplicity has contended that big asphalt plant capacity is no great accomplishment.



Production records at left were sent us unsolicited by Nittany Materials, Inc. and covered this Simplicity Electric-powered S-200 plant operating at Stroudsburg, Pennsylvania.



Entire plant operation under control of one man as shown in this air conditioned room.

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● The contractor's usual equipment handles the modified asphalt in the same manner essentially as without the neoprene.



● How the latex modified cutback strings out when a stick is withdrawn from the freshly applied seal material. This quality is identified with desirable behavior characteristics in service.

Costs for Delaware Test Road Applications

	Unmodified Asphalt Cutback	1½% Neoprene Modified Asphalt Cutback
Asphalt		
Cost per gallon from refinery	\$ 0.109	\$ 0.180
Cost per gallon applied	0.169	0.240
Cost per square yard applied*	0.042	0.060
Per cent increase per square yard		43%
Cover Material		
Cost of crushed gravel per ton	\$ 5.80	\$ 5.80
Cost of gravel per square yard applied	0.064	0.064
Surface Treatment		
Cost of asphalt and cover material per square yard applied	\$ 0.106	\$ 0.124
Per cent increase per square yard applied		17%
Cost of surface treatment per mile**	\$1,181.553	\$1,382.195

ban developments in what was open farmland. House concentration runs to some 50 houses per mile of road; traffic count runs into the thousands on what were previously rural roads.

Considerable of the highway budget has been devoted of necessity to major routes for through traffic. Meanwhile, despite continuing construction on local routes, a large volume of traffic has to be carried on a local road system of considerable antiquity.

As on many older roads, high crowns and no shoulders may be the rule rather than the exception. In addition, many of the roads cannot be closed off for an adequate period after surface treatment because of the number of residences which would have no alternate access route.

As a result, with conventional asphalt materials, surface retreatment often does not give adequate performance. Surface treated roads in New Castle County have ordinarily been retreated once a year, but in many locations they could well be retreated even oftener to keep the surface in top condition.

Over a period of years the Delaware state highway department has studied various combinations of aggregates and asphalts for surface retreatment, but none of these offered any significant improvement.

● **Test Sections.** In August, 1957, a new material was laid down. This was an RC-3 cut-back, made from asphalt modified with one and one-half percent of neoprene, used with conventional aggregate and standard methods of application.

The site was New Castle County road No. 336, the South Old Baltimore Pike between Christiana and Cooch's Bridge. To give control in the test, three sections were laid: 1.6 miles with neoprene modified asphalt, 1.1 miles with unmodified asphalt, and a second stretch of 1.9 miles with the modified asphalt.

The neoprene modified asphalt was prepared by Husky Oil Company, Cody, Wyoming, using neoprene latex to give a dry-weight neoprene content of one and one-half percent. This material was cut back with naphtha to make the RC-3. The retreating operation was done by the Stansbury Construction Company under state highway department supervision.

The same standard contractor's equipment and handling methods were used with the neoprene modified RC-3 as with the control, and

no difficulties were encountered during or after the operation. In contrast to the unmodified RC-3 control, the modified material showed good "build," no "run-off" during application, excellent chip retention immediately on opening to traffic, and no bleed-through after two weeks of extremely hot weather (see photos).

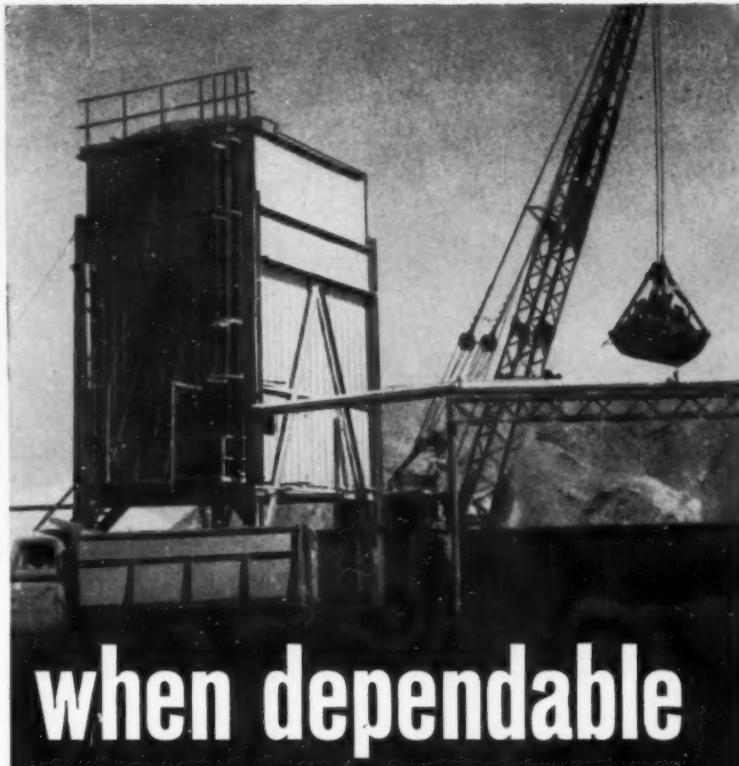
Asphalt, modified and unmodified, was applied at 200 to 210 degrees F. Application was at a rate of 0.25 gal. per sq. yd. except for a section of one-quarter mile where only 0.20 gal. was applied because of the material's ability to build up on a nonporous road surface rather than run off to the edges. The entire width of the 19-ft. pavement was covered in one pass of a high-pressure-type truck with a 20-ft. spraying bar. A pressure of 260 psi gauge was used for both control and modified asphalt.

The cover material was crushed gravel dredged from the river bottom, washed, crushed and graded to pass a 1/2-in. sieve (Delaware Grading Requirement No. 107). Soaking wet as received and used, it was applied in two passes by means of a 10-ft. spreader box at about 22 lb. per sq. yd. The chips were immediately compacted with a 6-ton pneumatic-tired roller.

At the completion of each 2,800-ft. shot, which required about 45 minutes, backed-up traffic was permitted to pass through at 20 mph. The road was opened to normal use at the end of the day's operation.

● **Good Adhesion.** Improved adhesion of the chips to the neoprene modified asphalt was readily apparent. Long, rubbery legs clung to each piece of gravel picked from the road. When the road was opened to traffic, very few chips were whipped off the neoprene modified section as compared with the control. Even with the first cars to pass, there was considerably less sound caused by thrown chips striking fenders and under-carriages.

Chips applied over damaged areas as long as two days after the modified asphalt had been laid were retained satisfactorily. This could not be done with the control even within two to three hours. However, neither neoprene modified nor control asphalt held gravel on areas previously patched with a cold-laid bituminous mix. These areas were so porous that the RC-3 cutbacks completely penetrated them.



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- **NO REFRactory** in furnace to replace or maintain. No stack.

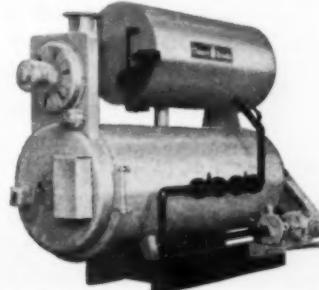
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After 16 months, including the worst winter recorded in Delaware for 50 years, the road treated with neoprene modified asphalt was in excellent condition. A minimum of patching at the edges of the pave-

ment had been required, and aggregate chips had been maintained on the road surface with virtually no bleed-through. Chips were firmly held by the asphalt, which still retained much of its original elastic-

ity. On the control section, considerable bleed-through was apparent, chips had been pressed down into the asphalt, and much of the road shoulder had required patching.

• **Good Skid Resistance.** Dramatic proof of the difference in the two surfaces was given by skid tests conducted in July, 1958. In "panic stops" at 40 mph, a test car averaged $9\frac{1}{2}$ ft. braking distance before coming to a complete halt on the surface treated with unmodified asphalt. On the neoprene modified sections, where the chips had been maintained at the surface, braking distance was only $8\frac{2}{3}$ ft., an added safety factor of 12.5 percent, or more than half a car's length.

The tests showed that the differential in braking effectiveness on the improved surface increased with speed. At 20 mph braking distance for the neoprene-modified paving was only 0.3 ft. shorter. At 30 mph, the difference was almost 7 ft. and reached the 12-ft. range at 40 mph. Tests also showed that wet pavements did not reduce superiority of the neoprene-modified asphalt, with an advantage of $6\frac{1}{10}$ ft. recorded for the modified material at 27 mph.

On the basis of experience with the initial test road and the reports of other highway departments, Delaware incorporated an 80,000 gal. program with neoprene modified asphalt into its previously contracted maintenance programs for the fiscal year 1958-59. Application is being done by the regular contractors using neoprene modified asphalt from local sources. The contractors have not experienced any of the difficulties with clogging of equipment which characterized earlier asphalt modifications with other elastomeric materials.

Some 50,000 gal. was laid down in autumn, 1958, in retreating roads in New Castle and Kent Counties. Projects planned for spring of 1959 under the direction of chief engineer Richard A. Haber include original surface treatment of new roads, further retreating and test roads in beach areas to study durability in the presence of salt atmosphere and tidewater. One such road in Kent County will cross three miles of marshland and terminate at the tide mark to give access to an outboard launching ramp.

Results to date in Delaware justify considerable confidence in neoprene modified asphalt as a means of increasing road life, maintaining a safer surface on the road,



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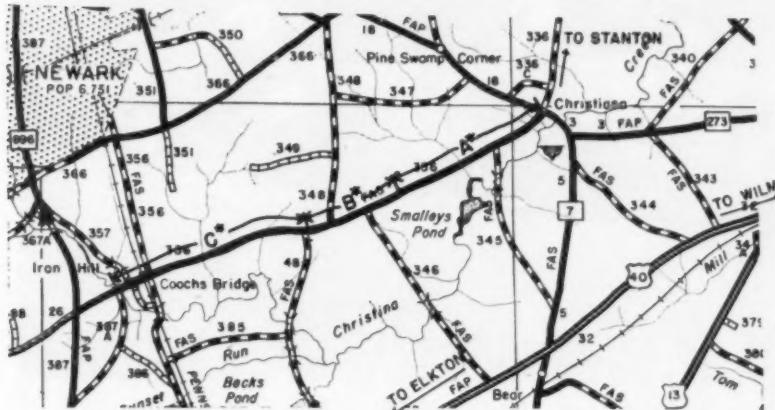
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- The test road described is located in the vicinity of one of Delaware's fast developing urban areas.

and reducing maintenance costs. While durability reports cannot be considered conclusive after 16 months of use, condition of the original test road surface supports expectation of wear life long enough to more than justify the minor increase in original cost of the material, even without taking into consideration savings in labor and material for patching.

On the basis of present and anticipated results through the second winter of experience, the Delaware state highway department expects that neoprene modified asphalt will be specified for a substantial percentage of its regular yearly maintenance contracts.

Sheet Asphalt Changes Under Long Service

The service behavior of sheet asphalt pavements constructed on upper Connecticut Avenue, Washington, D. C. over a 19-year period, is reported in the February, 1959, Public Roads Journal (Vol. 30 No. 6). By Jarl T. Pauls, Chief Bituminous Branch, and Woodrow J. Halstead, Head, Bituminous Materials Section, Bureau of Public Roads.

Progressive changes in the characteristics of the asphalt and the measurable physical properties of a sheet asphalt pavement constructed on upper Connecticut Avenue in Washington, D. C., were studied over a 19-year period. The tests con-

This issue of Public Roads is available on remittance of 20 cents to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

(Continued from page 179)

ments for the money available. The maintenance engineer is no exception to this rule. And his best, though not necessarily easiest, route to this admirable situation is through better engineering of seal-coats.

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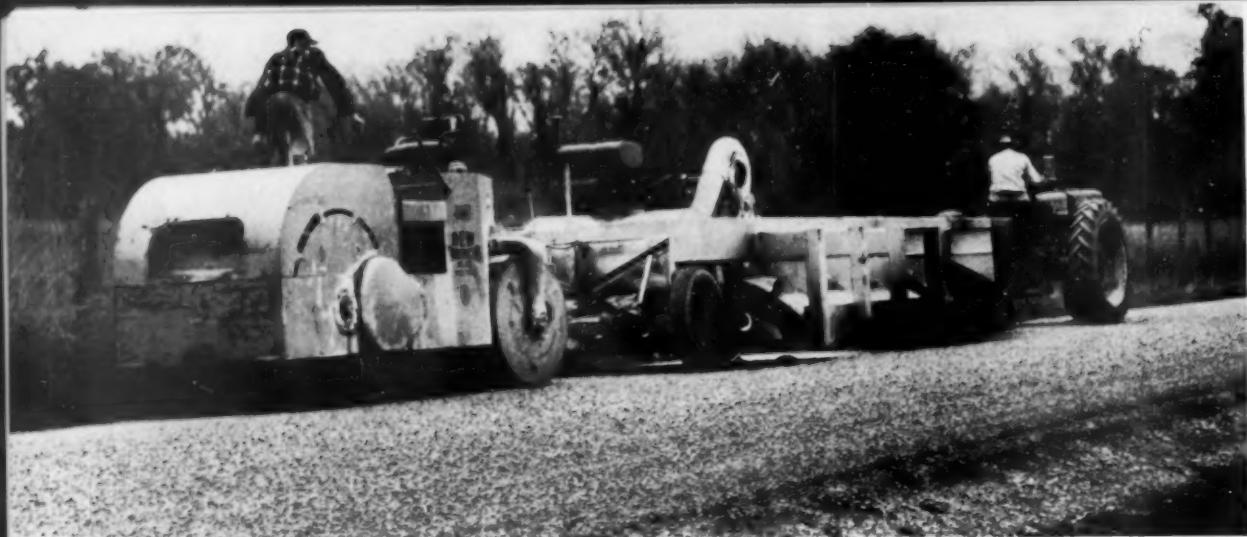
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• New type of surface heater used in Texas for heating seal chips on cold autumn days.

Traveling Heater For Sealcoat Cover Stone

Heating enabled Texas contractor to do sealing on cold autumn days, when otherwise the "specs" would have required shutting down the job.

A new method of heating cover stone after applying on a double surface treatment job was used late in 1958 by Dew Construction Company of Tyler, Texas, on their recent access road job on Highway 75 near Richland.

Texas highway regulations for years have prohibited doing seal or surface treatment using asphalt cement in winter months. As this works a hardship on a contractor trying to finish a sizable base job that may require a comparatively small amount of asphalt, a provision has been added in a number of cases, that if cover stone was heated either before or after applying, the work could be done in winter if outdoor temperature was above 40 degrees and rising.

Mr. Dew elected to heat the stone after applying it to the freshly shot surface. The heater is oil fired, having four burners using 15 to 20 gal.

per hour each of diesel fuel or kerosene. The heating pan or cover is 20 ft. long and 8 ft. wide inside, and lined with refractory which reflects radiant heat to the road surface. The road temperature can be raised from 50 degrees to 250 degrees at a travel speed of one mile per hour, higher with slower travel speeds of tractor pulling the unit.

The surface is heated to a depth of $\frac{1}{2}$ in. or more and retains heat for 4 to 5 minutes, long enough for rolling to press the stone well into the melted asphalt and insure the stone being well-coated on one side with the asphalt. The roller should be kept close behind the unit. Better heating is obtained if the stone is exposed to air and sun long enough after spreading to dry any moisture that was present, before heating.

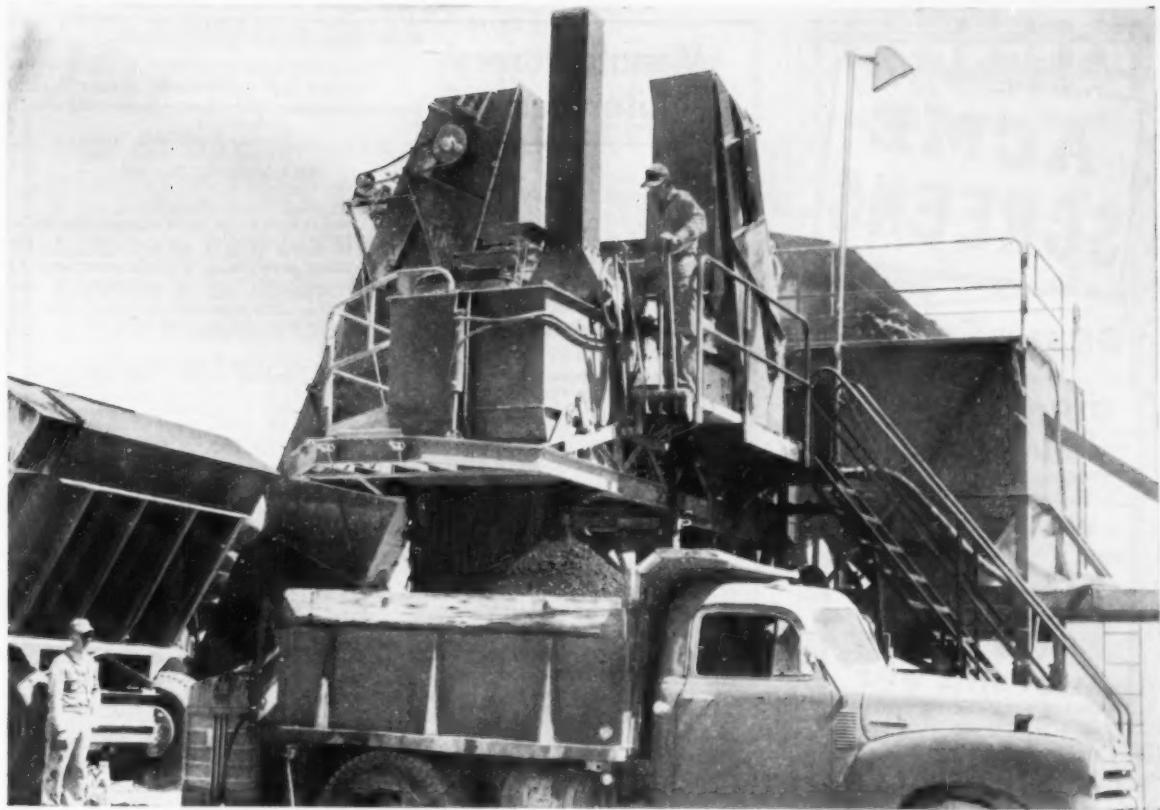
The heating pan is adjustable to within 1 in. of the road surface, or to 12 in. road clearance for turning. The surface heater was made by W. E. Grace Mfg. Co., of Dallas, Texas, manufacturers of sweepers, spreaders, pneumatic and sheepfoot rollers, as well as several types of asphalt heaters.

New ASTM Specification for Asphaltic Concrete

A signal accomplishment was reported at the meeting of Committee D-4 on Road and Paving Materials on February 6, during ASTM Committee Week in Pittsburgh. It concerns the development of a single consolidated and simplified specification for hot-mixed, hot-laid asphaltic paving mixtures which should be of great aid to the road building industry. This accomplishment in ASTM was by joint cooperation with representatives of the American Association of State Highway Officials and the Asphalt Institute.

A major contribution from the committee will be the sponsoring of several symposia at both the 1959 Annual Meeting in Atlantic City in June and the 3rd Pacific Area National Meeting in San Francisco in October. The plans for these sessions were reported to the committee indicating that the general theme was to be related to the national highway program. Further information will be covered in the April issue of the ASTM Bulletin.

The next meeting of the committee will be held during the Society's Annual Meeting the week of June 21, 1959. Committee officers are: Chairman: A. B. Cornthwaite, Virginia Department of Highways; Vice-Chairmen: R. E. Bollen, Arlington, Va.; J. E. Gray, National Crushed Stone Assn., Washington, D.C.; and J. O. Izatt, Shell Oil Co., New York, N.Y.; General Secretary: J. M. Griffith, The Asphalt Institute, College Park, Md.



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Manufacturers' Literature

(Continued from page 166)

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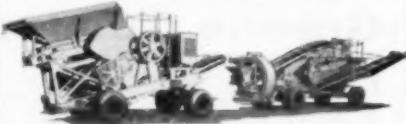
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"ALLISON TRANSMISSION MEMO"—Jan.-Feb., 1959 is an attractive 8-page folder presenting specific instances of the effective use of products of the Allison Division of General Motors Corp., Indianapolis 6, Ind.

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TO HELP CONTRACTORS DETERMINE the proper type of concrete vibrator for use on specific jobs. The Dart Manufacturing & Sales Co., 1002 South Jason St., Denver 23, Colo. has developed an Engineering Vibrator Guide questionnaire. Contractors may fill in on this single sheet the type of job, size of aggregate, volume of dump, total cubic yards, slump requirements and a variety of other facts along with a rough sketch or diagram of their job. The Dart engineering department will write their recommendations on the opposite side and return the data to the contractor. Dart makes no charge for this service. The questionnaires are

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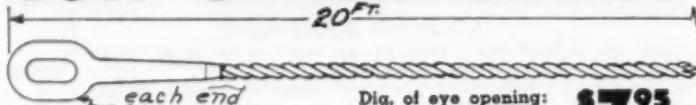
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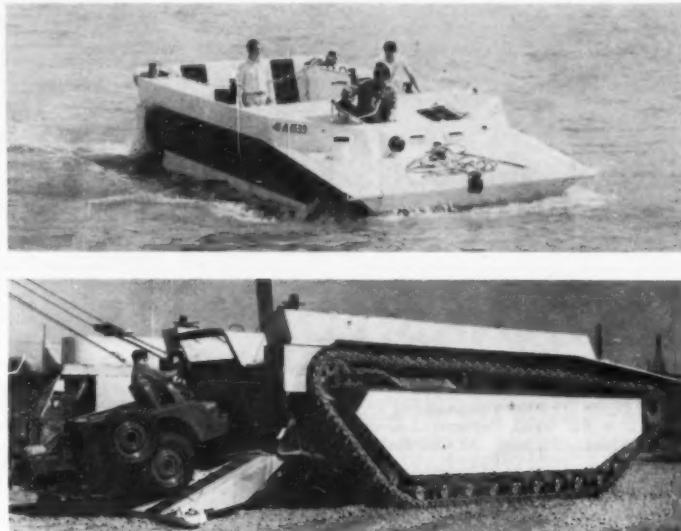
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172	MP-116	24 to 30 ft.	Kansas
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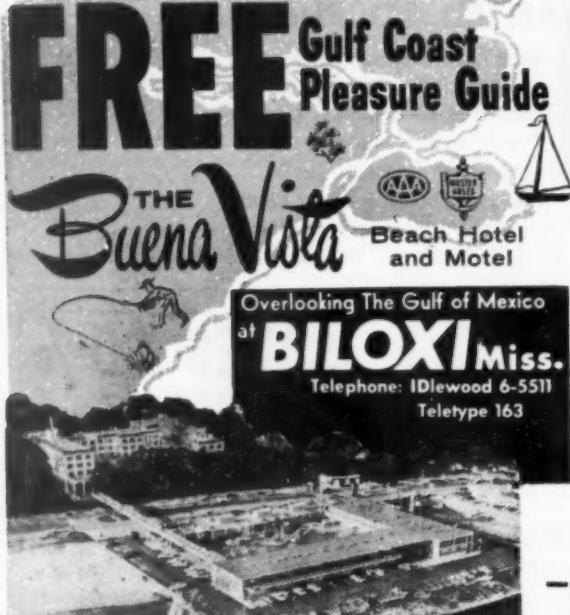
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At 50 Years, Wisconsin Motor Recalls Early Racing Days

Wisconsin Motor Corporation, celebrating its golden anniversary in 1959, received a needed boost in its early days from the budding sport of automobile racing.

The young company built water cooled engines for racing cars and stock cars of various makes, including the Kissel, Case, Cutting and Stutz. Such famous old-time racers as Tom Rooney, Ralph de Palma, Gil Anderson, Bob Burman and Sig Haugdahl hung up many records with Wisconsin-powered racers. The first automobile ever to travel three miles a minute, driven by Sig Haugdahl at Daytona Beach in 1920, had a Wisconsin "Special" 250 hp engine.

With its output now in air cooled engines, Wisconsin today supplies a power range from 3 to 56 hp in 4-cycle, single, 2- and V-type 4-cyl. models. There are more than 2,000 authorized Wisconsin service stations and distributors now in the United States, plus overseas distribution facilities in 90 countries.

The start of Wisconsin Motor Corporation's second half-century is being marked by the construction of a new engineering building and testing laboratory at its Milwaukee headquarters.



Tony Koveleski and his Wisconsin-powered 1914 Stutz Bearcat.

LeTourneau-Westinghouse Co. Adopts Trademark

THE DESIGN SHOWN is to be used as a new trademark by the LeTourneau-Westinghouse Company of Peoria, Ill., and will appear on all earthmoving, construction, logging and heavy materials handling equipment manufactured by this firm. It was adopted, according to Merle R. Yontz, President of the Company, because of its boldness and simplicity, and to avoid any



possible confusion of the company name with such products as electric toasters or off-shore drilling rigs.

KOEHRING COMPANY had the unique experience of having each of its 10 plant locations report considerably improved safety records for the past year, according to Foster Shoup, Training Director.

The Kwick-Mix Division at Port Washington, Wis., was first in the inter-plant competition for the third straight year.

Koehring Southern, Chattanooga, Tenn., placed second with a 2.9 frequency rate, based on per million man hours worked. Following with a 4.9 rate was the Buffalo-Springfield Division at Springfield, Ohio. Koehring Division, Milwaukee, was fourth, showing a 5.3 rate. C. S. Johnson, Champaign, Ill., scored 7.2 and Parsons Division, Newton, Ia., was sixth with a 9.3 rate.

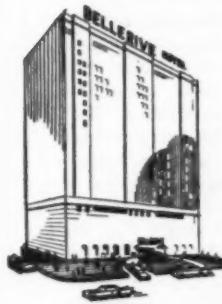
CORRUGATED METAL PIPE ASSOCIATION, 140 S. Dearborn St., Chicago 3, Ill., has named Web W. Ballinger as Division Engineer, with headquarters in Denver. He will work in a promotional engineering capacity in the states of Colorado, New Mexico, Utah, and Wyoming under direction of the Chicago office.

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MANUFACTURERS AND ENGINEERS — SAND BLAST AND DUST
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SOME 491 NEW GMC TRUCKS—including a number of pickups especially equipped to "ride the rails" like section cars—are being put into service by the Baltimore and Ohio Railroad Company, according to R. C. Woodhouse, general truck sales manager of GMC Truck & Coach Division. Earmarked for truck maintenance work, the vehicles will operate out of strategic rail centers throughout the B & O system.



Part of Baltimore and Ohio Railroads order of GMC trucks shortly before shipment from the Pontiac, Mich. plant.

WILLIAM E. LITTLE, chairman of the board, Bucyrus-Erie Co., South Milwaukee, Wis., and Philip Ryan, president of Cutler-Hammer, Inc., Milwaukee have been re-elected to a one-year term on the board of the National Industrial Conference Board.

VERN L. SCHIELD, Chairman of the Board of the Schield Bantam Company, Waverly, Iowa, has announced the election of Buel M. Wallis as a Vice President and an Officer of the Company. Wallis was elected to his new office at the Company's Board of Director's meeting in Chicago.

CHAMPION MANUFACTURING COMPANY, of St. Louis, manufacturers of



Construction Equipment, removed from their old quarters at 2028 Washington Ave., effective March 1st, to occupy a much larger space at 3700 Forest Park Boulevard. The new fa-

cilities, totaling 30,000 square feet, were acquired as part of Champion's overall expansion program to keep pace with the building boom throughout the nation today.



... built to take a beating on construction jobs, in mines, on the farm, railroad crews, on service trucks ... wherever men work and the going is rough.

They keep drinking water cool and sanitary, keep worker efficiency up. And note these features:

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IN KANSAS CITY IT'S THE
BELLERIVE HOTEL
100% AIR-CONDITIONED



THE NOBLE COMPANY, manufacturer of concrete batching plants and materials handling equipment, announces the appointment of Van Barber as Southwest Regional Sales Manager of the batching plant division in Los Angeles and Larry Taylor as Sales Executive in the automation division with headquarters in Oakland, California.

A \$775,000 EXPANSION PROGRAM TO increase Armco Steel Corporation's stainless steel output will begin this month at the Baltimore, Md., Works. C. G. Davies, vice president—operations, Armco Division, announced today. Two new double ingot heating furnaces and three new heat-treating furnaces are to be installed.

"The ingot heating will permit the production of increased tonnages of special grades of stainless steel now in greater demand by customers," Davies said. "With the additional heat-treating furnaces, we will have more capacity for the controlled cooling or heat treating of billets before they are transferred to other rolling mills or shipped to customers."

INTERNATIONAL HARVESTER COMPANY has entered into agreements with the Danuser Machine Works of Tulsa,

Oklahoma, and the Danuser Machine Company of Fulton, Missouri, whereby it will purchase certain equipment manufactured by these companies for use with Harvester's line of wheel-type commercial tractors. Harvester, in turn, will supply such equipment to its farm and commercial equipment dealers and company-owned retail stores. Items to be purchased by Harvester will include "Danco" center-mounted commercial rotary mowers from Danuser Machine Works of Tulsa, and rear-mounted blades, scarifiers, and scoops manufactured by Danuser Machine Company of Fulton. Although the names of the two manufacturing companies are similar, there is no operation relationship between the companies.

ING. LUIS C. VELAZQUEZ has been appointed district representative for the Construction Equipment Division of Baldwin-Lima-Hamilton Corporation at Lima, Ohio, manufacturers of LIMA shovels, cranes, draglines, LIMA Austin-Western crushing, screening and washing equipment and vibratory compactors; Austin-Western Works at Aurora, Illinois, manufacturers of graders, hydraulic cranes and sweepers; Madsen Works at La Mirada, California, manufacturers of asphalt plants, concrete finishing machines, dryers and

dust collectors. He will represent the Baldwin-Lima-Hamilton Construction Equipment Division in Mexico, Central American countries, the West Indies and Caribbean Islands.

S. W. FLESHEIM, founder and board chairman of the Master Builders Company, Cleveland, is now on a two-month world tour of his firm's markets, and manufacturing and sales facilities in Hawaii, New Zealand, England, France, Belgium, Benelux, Italy, Germany and South Africa.

Accompanying Mr. Flesheim is Mr. Robert Mauchel, Master Builders' vice president, international sales. Master Builders, a division of The American-Marietta Company, is the world's largest producer of admixtures for concrete.

JEROME T. COE has been named general manager of General Electric Company's Silicone Products Department at Waterford, N. Y., according to an announcement by Robert L. Gibson, vice-president of the company and general manager of the Chemical and Metallurgical Division. Mr. Coe succeeds Dr. Charles E. Reed who becomes general manager of General Electric's Metallurgical Products Department.

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Are you still active in the field? Have you moved or changed your position? Unless you send this information directly to us we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. Your name might be cut from the mailing list.

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New Capacity—19.5 cu. yd. (struck rating)
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Series B Scraper

New Capacity—19.5 cu. yd. (struck rating)
27 cu. yd. (heaped rating)

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Adding to Milwaukee's mileage of Texaco-paved streets

Year after year, Milwaukee has added steadily to its mileage of plant-mixed Texaco Asphalt paving, serving both business and residential traffic. Van Buren Street, shown here, received a 3-inch surface of hot mix Texaco Asphaltic Concrete, laid in two courses. Many other Milwaukee thoroughfares have been paved with another heavy-duty pavement of the plant-mixed type, Texaco Sheet Asphalt.

The continued growth of Milwaukee's mileage of Texaco-paved streets is the best kind of evidence of satisfaction with the pavement's durability, economy and velvet-smooth riding quality.

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Two helpful Texaco brochures describe the materials and methods recommended for all types of Asphalt paving, suitable for streets, highways, airports, parking areas, etc. Copies can be obtained without obligation by writing our nearest office.



Laying 3-inch hot-mix Texaco Asphaltic Concrete pavement on Van Buren Street in Milwaukee. Long-handled lute in foreground of small photo is used to check pavement's smoothness.

Contractor—Highway Pavers, Inc., Milwaukee.

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